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ATLAS OF UNITED STATES TREES

Volume 4. Minor Eastern Hardwoods

by Elbert L. Little, Jr.



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**ATLAS
OF
UNITED
STATES
TREES**

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Volume 4. Minor Eastern Hardwoods

by

Elbert L. Little, Jr., Chief Dendrologist

Timber Management Research
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"Minor Eastern Hardwoods" is the fourth volume of an Atlas showing the natural distribution or range of the native tree species of continental United States. This volume contains large maps of 166 tree species native in eastern contiguous United States. The area covered is from Maine west to North Dakota, south to Texas (except Trans-Pecos Texas), and east to Florida (excluding tropical trees of the southern part). Thirty-seven States are included. However, about 30 species of western hardwoods that extend eastward into 1 or more of the 6 intermediate or Midwestern States from North Dakota to Texas are in Volume 3. Additional occurrence beyond is plotted on a map of North America. Among the 23 species with local distribution are 1 classed as extinct except in cultivation, 3 as endangered, and 9 as threatened.

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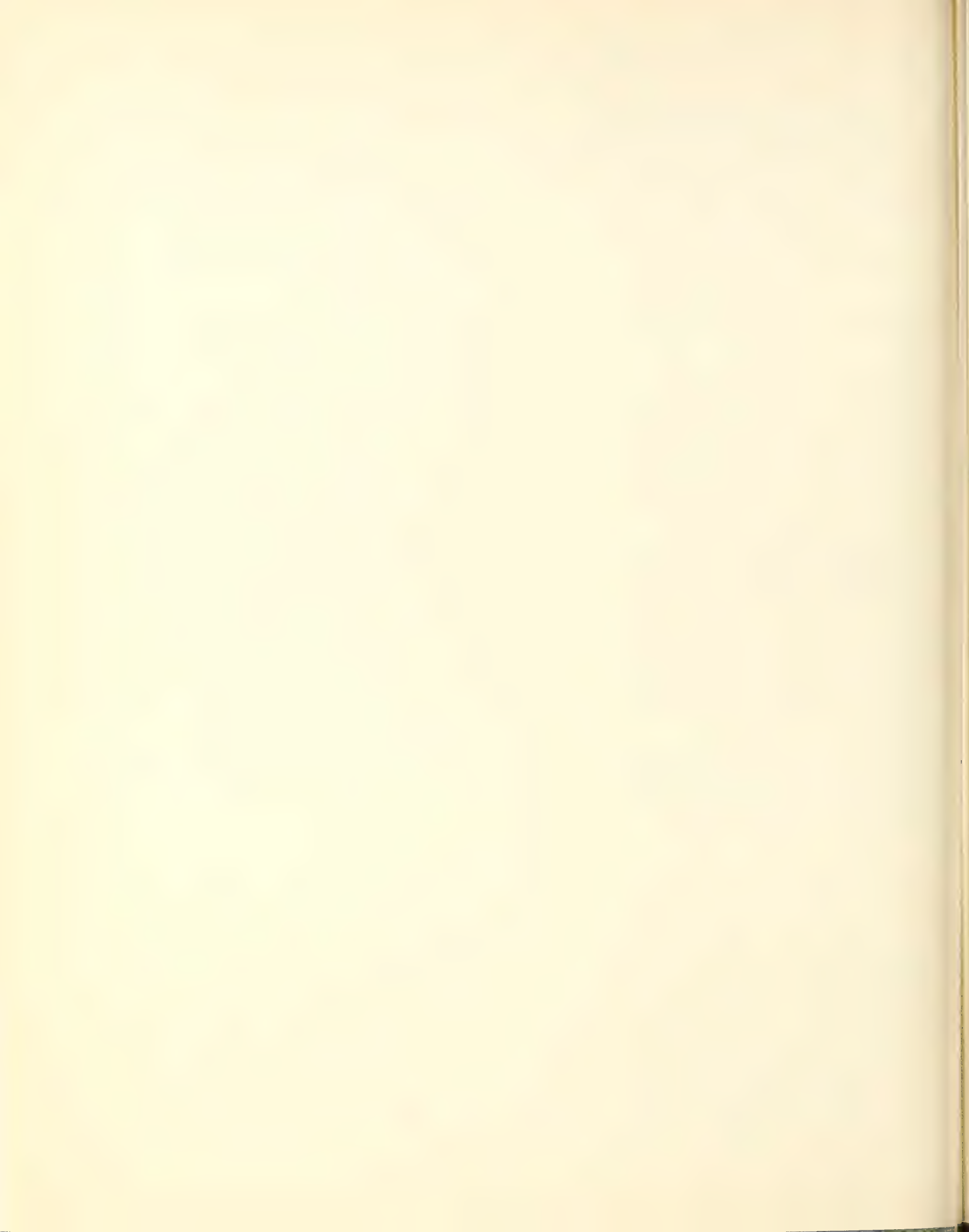
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ATLAS OF UNITED STATES TREES

VOLUME 4. MINOR EASTERN HARDWOODS

INTRODUCTION

This volume is the fourth of a five-volume Atlas with large maps showing the natural distribution or range of the native tree species of continental United States. "Atlas of United States Trees, Volume 1. Conifers and Important Hardwoods" (Little, 1971a¹) has an introduction to the series, which may be condensed and adapted here.

Maps demonstrate clearly, graphically, and better than written summaries where the trees grow wild and have many obvious uses. Assembled in atlas form for ready reference, these distribution maps are available to foresters, botanists, and all others interested in trees for use without restriction, since U.S. Government publications are not copyrighted.

The native tree species are not distributed across the United States at random, nor are they dispersed equally by States. Some tend to occur, however, in similar patterns related to climate and other factors. A brief summary of the contents follows. All volumes except the first are limited and arranged geographically.

Volume 1 contains maps of 200 native tree species, all the native conifers or softwoods, including the needleleaf and cone-bearing evergreens (94 species, also 2 shrub species) and the important hardwoods (106 species). Coverage is partly botanical and partly practical. Nearly all trees now important commercially for lumber are represented. Occurrence in Alaska is shown on maps of North America.

Volume 2, "Alaska Trees and Common Shrubs" (Viereck and Little 1975), has maps of Alaska for 82 native species, including 32 of trees, 6 of shrubs rarely reaching tree size, and 44 more of common shrubs. This special volume was needed because the northernmost and largest State is geographically separated from the others. It follows and also supplements "Alaska Trees and Shrubs" (Viereck and Little 1972). That handbook primarily for identification has descriptions, drawings, small maps, and additional information for 128 species, including the remaining shrubs. Occurrence outside Alaska is shown on North American maps in Volumes 1 and 3.

Volume 3, "Minor Western Hardwoods" (Little 1976a), contains maps of 210 tree species native in western contiguous (or conterminous) United States but not in Volume 1. The area covered includes all 11 far western contiguous States—Washington, Idaho, Montana, Oregon, California, Nevada, Utah, Wyoming, Colorado, Arizona, and New Mexico—and also Trans-Pecos Texas (the southwestern part west of the Pecos River).

Coverage extends eastward for those western species also in the row of 6 Midwestern States—North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. Thus, ranges are charted in

17 States. Also, occurrence in Alaska of 15 species is shown on maps of North America.

Volume 4, "Minor Eastern Hardwoods," contains maps of 166 tree species native in eastern contiguous United States not in previous volumes. The area covered extends west to include the row of 6 Midwestern States—North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. Thus, ranges are charted in 31 Eastern States and also in part the 6 just mentioned. However, the tropical trees confined to southern Florida are omitted. Also, the genus of hawthorns (*Crataegus*) has been left out because of taxonomic difficulties.

Volume 5, "Florida," will have maps of nearly 100 species of tropical trees confined mostly to the southern part of that State. Also to be included are maps of the remaining tree species native in Florida, adapted from those in Volumes 1 and 4.

The native tropical trees of Hawaii and the Commonwealth of Puerto Rico are best treated separately. Maps of 100 species in Puerto Rico based on a forest survey were published in "Common Trees of Puerto Rico and the Virgin Islands" (Little and Wadsworth 1964).

HISTORY OF TREE DISTRIBUTION MAPS

The history of tree distribution maps in the United States has been reported in Volume 1, while early work by the Forest Service has been reviewed by Little (1951). George B. Sudworth, first dendrologist of the Forest Service, began work with the Division of Forestry in 1886. Tree ranges were summarized in the two editions of his "Check List of Forest Trees of the United States, Their Names and Ranges" (Sudworth 1898, 1927).

Soon after establishment of the Forest Service in the United States Department of Agriculture in 1905, Sudworth undertook a project of preparing a distribution map for each native tree species of North America, exclusive of those occurring wholly in Mexico and minor tropical trees of southern Florida. Many thousand locality records for individual species were filed on separate cards from publications such as botanical lists and forest surveys, unpublished field notes, and herbarium specimens. For each species these localities were plotted by number on one or more large cloth-backed maps of contiguous United States, North America, or Alaska. These maps and card file are preserved in the dendrology project, Timber Management Research, Forest Service, Washington, D.C.

Publication of these maps was begun by Sudworth (1913) under the title, "Forest Atlas—Geographic Distribution of North American Trees." Only "Part I—Pines" ever appeared. However, five bulletins on Rocky Mountain trees by Sudworth contain small species maps prepared for the larger reference.

¹ Names and dates in parentheses refer to Selected References, p. 15.

It is indeed unfortunate that Sudworth's entire Atlas, with a map for each of nearly 500 native tree species then distinguished, was not issued promptly, when the maps represented current knowledge. Some years later, Munns (1938) published distribution maps of 170 important forest tree species of the United States. With minor additions, the maps were based very largely upon data by Sudworth, who died in 1927.

Besides "Volume 2, Alaska Trees and Common Shrubs," other publications of the Forest Service have been devoted to maps of the trees of a single State. In 1941-50, the Forest Survey published distribution maps of commercial forest trees in four Southeastern States, Mississippi, North Carolina, South Carolina, and Virginia. "The Distribution of Forest Trees in California," by James R. Griffin and William B. Critchfield (1972), has detailed maps of 86 species of that State, including the conifers and commercially important hardwoods and most other large trees.

COVERAGE OF THIS VOLUME

"Atlas of United States Trees. Volume 4. Minor Eastern Hardwoods" continues "Volume 1, Conifers and Important Hardwoods." The Forest Service "Check List of Native and Naturalized Trees of the United States" (Little 1953) serves as a basis for the species included as trees, their accepted scientific names, and their approved common names. That reference contains other common names in use ("Index of Common Names," p. 451-472) and current synonyms of the scientific names. Thus, names of species not found in this volume may be traced and correlated. Several minor changes in nomenclature accepted after publication of the 1953 edition are noted under "Tree Names" (page 5).

The Check List apparently is the only current compilation of the native woody-plant species that reach tree size and that should be mapped in this Atlas. Obviously, the number of tree species included here depends somewhat upon the definition used. That of the Check List (Little 1953, p. 5) is followed and repeated here, with insertion of approximate metric equivalents (and slight increase in height to agree): Trees are defined as woody plants having one erect perennial stem or trunk at least 3 inches (7.5 centimeters) in diameter at breast height (4½ feet or 1.3 meters), a more or less definitely formed crown of foliage, and a height of at least 13 feet (4 meters).

Large willows (genus *Salix*) with several trunks from the same root have been included. However, a few species of willow rarely recorded as trees have been excluded, as cited under "Tree Names."

Species whose individuals sometimes reach the above dimensions somewhere within their natural range have been included in this Atlas as well as in the Check List. Many of the minor hardwoods mapped here are commonly smaller over most of their ranges and are regarded locally as shrubs. Several borderline species were mentioned in notes in the 1953 Check List. Most of those are described in current floras as becoming small trees and have been added here under "Tree Names." Inclusion of these shrubby trees has increased the number of maps and also time of preparation. Obviously, many species of large shrubs are excluded. Thus, the extra maps of this volume may be useful in the absence of a similar Atlas on the larger number of native shrubs.

"Volume 4, Minor Eastern Hardwoods," with 166 species not in previous volumes, aims to complete the maps of the tree species native in eastern contiguous United States, except the tropical trees of southern Florida and the genus of hawthorns (*Crataegus*). Volume 1 has about 121 eastern tree species, all the eastern conifers, or cone-bearing softwoods, including the needleleaf evergreens, totaling

32 species (also 2 shrubs) and 89 species of hardwoods classed as important. The total number of eastern tree species mapped in both volumes as native is approximately 287.

The trees of this volume are classed as angiosperms or flowering plants. The term hardwood generally is used for trees of dicotyledons, flowering plants with trunks of bark and wood usually hard, which increases in thickness by annual growth rings. Also added to this volume are 4 tree species of monocotyledons, flowering plants whose trunks are not divided into bark and wood and whose less compact woody tissue does not increase in thickness by growth rings. These southeastern monocotyledons are included here for completeness, though technically they are not hardwoods. Two southeastern species of *Yucca*, *Yucca*, reach tree size. This volume has 2 species of palms that rarely attain the minimum dimensions, *Sabal minor* (Jacq.) Pers., dwarf palmetto, and *Serenoa repens* (Bartr.), Small, saw-palmetto. Also, *Sabal palmetto* (Walt.) Lodd., cabbage palmetto, is in Volume 1, and *Sabal mexicana* Mart., Mexican palmetto, of extreme southern Texas, is in Volume 3. Six species of tropical palms of Florida will be mapped in Volume 5.

The area covered in Volume 4, with the exceptions noted below, is eastern contiguous United States from Maine west to North Dakota, south to Texas (except Trans-Pecos Texas), and east to Florida (excluding tropical trees of the southern part). These 37 Eastern States are in base maps 2-NE and 2-SE.

A sharp separation of species geographically into different volumes was not practicable. Most tree species clearly are eastern or western, but several are widespread across the country and some overlap along the central part. For most Eastern States, only Volumes 1 and 4 should be consulted. These are the 31 States from Maine west to Minnesota, south to Louisiana, and east to Georgia and Florida (except the southern part).

"Volume 3, Minor Western Hardwoods" is needed also for 6 intermediate Midwestern States: North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. Most tree species in these States will be found in Volumes 1 and 4. However, about 30 species of western hardwoods of Volume 3 extend eastward from the 11 far Western States into 1 or more of the above 6 but not beyond. Thus, the entire range is shown on a single map in Volume 3, not repeated here.

Trans-Pecos Texas (the southwestern part west of the Pecos River) is treated with the 11 far Western States in Volume 3. Also mapped there and omitted here are about 15 species of subtropical trees which extend northward from Mexico into southern Texas but no farther eastward.

For nearly all tree species, the entire natural distribution is mapped in one volume. However, about 20 of Volume 4 are widespread across the country or both eastern and western. The entire range of several is shown on a map of North America. Detailed maps showing occurrence by counties in Western United States are in Volume 3.

A separate volume will be devoted to the native trees of Florida, as noted before. Many native trees of Florida are mapped in Volumes 1 and 4. Southern Florida has nearly 100 additional species of tropical trees native nowhere else in continental United States. "Volume 5, Florida" will contain these tropical trees on large base maps and the other native trees on small maps adapted from Volumes 1 and 4.

The genus of hawthorns (*Crataegus*) has been left out of this volume because of taxonomic difficulties, as noted. In Volume 3, however, 7 western species are mapped. More than 1,100 specific names were published for the native plants of this genus, nearly all in the quarter century beginning about 1899 by three investigators working independently. The taxonomic group of species became a

narrower unit than in related genera and was based upon less significant differences in botanical characters. According to later studies, most of these numerous binomials apparently designate minor variations ("apomictic segregates") derived from hybridization and propagated vegetatively by seeds without pollination.

The compilation of *Crataegus* in the Forest Service Check List (Little 1953) listed 140 additional eastern species and mentioned 34 others in notes, following treatments by specialists in floras. Later manuals have accepted far fewer species (or species groups). For example, Gleason and Cronquist (1963) reduced the number for Northeastern United States to 24. For North and South Carolina, Radford, Ahles, and Bell (1968) recognized and mapped only 13. In Texas, Correll and Johnston (1970) accepted 33.

Lack of uniformity in species concepts, especially from one State to another, obviously restricts the value of maps in *Crataegus* compiled from herbarium labels. Also, coverage varies in detail and may be irregular or spotty by localities. As in any large genus, identification is difficult. For Ohio, Braun (1961) attempted to plot by counties 61 native species.

Perhaps the populations of hawthorns (*Crataegus*) native in Eastern United States could be arranged or "lumped" for practical study into a workable number of about 25 to 40 species or species groups. Then distribution could be compiled, first by presence or absence in each State. Meanwhile, the eastern species of this genus are omitted.

The 166 species of minor eastern hardwoods (including 4 of monocotyledons) mapped in this volume are grouped within 75 genera and 41 plant families. A botanical index of genera and families appeared in the Check List (Little 1953, p. 445-450). Totals are incomplete, because important hardwoods are in Volume 1. Largest genera in Volume 4 are: cherry-plum (*Prunus*), 11; holly (*Ilex*), oak (*Quercus*), and willow (*Salix*), 10 each; and dogwood (*Cornus*) and viburnum (*Viburnum*), 6 each. Combined with Volume 1, the largest genera of eastern hardwoods are: oak (*Quercus*), 31 species; cherry-plum (*Prunus*) and willow (*Salix*), 12 each; hickory (*Carya*) and holly (*Ilex*), 11 each; and maple (*Acer*), 9.

PREPARATION OF THE MAPS

The maps in this volume have been compiled from various sources, following the procedure explained in previous volumes. Principal records on tree distribution include publications, herbarium specimens, field work, and review by botanists, foresters, and others. The more detailed publications consulted are listed under Selected References (p. 15). Credit is due many persons for their valuable assistance. The list of publications and persons consulted is too long for citation here. Naturally, the compiler is responsible for all errors.

Publications with information about tree distribution have been examined for each State. Tree guides and similar books for identification have been compiled in a recent bibliography (Little and Honkala 1976). State floras, manuals, and catalogs have been consulted.

References for several States summarize tree species distribution accurately and in detail almost as precise as maps, such as by counties or counties along the border or, for rare species, by localities. In other States, scattered published local floras with lists by counties or similar geographic units have been helpful in filling the gaps. The classic Manual by Sargent (1926) contains important locality records. Notes on range extensions are found in various scientific periodicals. Several unpublished theses with maps or other distribution records have been examined.

Published maps have been valuable sources in this compilation. Altogether, more than one-fourth of the States now have publications with distribution maps of all or most native tree species, as noted in the first volume (Little 1971a, p. 5). These, with author and year, for 12 of the 37 Eastern States of this volume, are: Alabama (Clark 1971); Georgia (Harper 1907-08; Duncan 1950); Illinois (Miller and Tehon 1929; Jones and Fuller 1955); Indiana (Deam 1932); Kansas (Hitchcock 1899; Gates 1938; Stephens 1969); Missouri (Steyermark 1963); Nebraska (Pool 1919); North and South Carolina (Radford, Ahles, and Bell 1965, 1968); Ohio (Braun 1961); Oklahoma (Williams 1973); and Wisconsin (Fassett 1930). One recent reference shows dots for counties in 4 States (including 2 not named above), North Dakota, South Dakota, Nebraska, and Kansas (Stephens 1973). Maps of several species in this volume were included in the reference on wild flowers of western Pennsylvania and parts of adjacent States by Jennings (1953). Besides the 14 States mentioned, 2 others with maps in theses not yet published are Virginia (James 1969) and Arkansas (Tucker 1976).

Examples of references with detailed information but no maps are: Connecticut (Graves and others 1910); Delaware and Eastern Shore of Maryland and Virginia (Tatnall 1935); southern New Jersey (Stone 1911); Maine (Hyland and Steinmetz 1944; Ogden, Steinmetz, and Hyland 1948); New York (Taylor 1915); Vermont (Seymour 1969); and Virginia (Massey 1961).

"Index Holmensis, a World Index of Plant Distribution Maps" (Tralau 1969-74) cites published maps by species and will be valuable in future compilation. The first three volumes on gymnosperms and monocotyledons have very few species charted here. Hardwoods will be covered in the remaining volumes on dicotyledons.

The ranges of some native tree species of Eastern United States continue northward into Canada and have been compiled from published references. "Native Trees of Canada" (Hosie 1969) contains small maps of the forest tree species. Trees of Newfoundland and Labrador were charted by Bearnes (1968). Some species of Ontario were mapped by Fox and Soper (1952-54) and Soper and Heimburger (1961). Two floras of eastern provinces contain dot maps, that of Prince Edwards Island by Erskine (1960) and of Nova Scotia by Roland and Smith (1969). Many species of Quebec were plotted by Rousseau (1974).

Among the most detailed published maps are those of taxonomic monographs and those of a single species based upon extensive field work, such as a doctoral thesis. However, few species of this volume have been so thoroughly studied. *Kalmia latifolia*, mountain-laurel, was plotted by Kurmes (1967). Examples of generic monographs with maps among the minor eastern hardwoods are: *Aesculus* (Hardin 1957); *Amelanchier* (Jones 1946); *Bumelia* (Clark 1942); *Cercis* (Hopkins 1942); *Fraxinus* (Miller 1955); *Osmanthus* (Green 1962); *Ptelea* (Bailey 1962); *Rhamnus* (Wolf 1938); *Rhus* (Barkley 1937); and *Tilia* (Jones 1968).

Also, a few publications about plant families have species maps. Two in the legume family, Leguminosae, are "The legumes of Texas" (Turner 1959) and Subfamily Mimosoideae (Isely 1973). The cyrilla family, Cyrillaceae, was monographed by Thomas (1960). The genus *Illicium* was treated in a larger monograph by Smith (1947). The taxonomic review of the tea family, Theaceae, in the United States has locality data (Kobuski 1951).

Examples of generic monographs with distribution data but without maps are *Bumelia* (Cronquist 1945); *Cornus* (Rickett 1945); *Erythrina* (Krukoff 1939); *Forestiera* (Johnston 1957); *Kalmia* (Ebinger 1974); *Persea* (Kopp 1966); *Sabal* and *Serenoa* (Bailey

1944); *Sorbus* (Jones 1939); and *Viburnum* (McAtee 1956). Also, some studies of plant distribution contains maps, such as McVaugh (1952) and Little (1971b).

Herbarium specimens have been an important source in the preparation of the maps of minor eastern hardwoods. While traveling in every State, the compiler visited herbaria in nearly all. In 13 States, locality records were copied from specimen labels.

Some State herbaria maintain unpublished card files of maps showing by dots where herbarium specimens were collected, either by counties or localities. In these 14 States, species maps with locality records of specimens kindly were made available or were compiled by the curators, as follows: Florida, Robert W. Long; Georgia, Wilbur H. Duncan; Kentucky, R. Cranfill and Willem Meijer; Louisiana, William D. Reese; Minnesota, Gerald B. Ownbey and Thomas Morley; New York, Donald M. Lewis; North Dakota, Orin Alva Stevens; Pennsylvania, Edgar T. Wherry; South Dakota, Theodore Van Bruggen; Tennessee, Aaron J. Sharp; Texas (incomplete), Billie L. Turner; Vermont, Frank C. Seymour; West Virginia, Earl L. Core; and Wisconsin, Hugh H. Iltis and Theodore S. Cochrane.

For New England comprising 6 States, the maps of many species prepared by the New England Botanical Club have been copied. Also, the maps for Maine have been reviewed by Fay Hyland. Maps of many species in Maryland were contributed by Grace S. Brush, Energy & Coastal Zone Administration, Maryland Department of Natural Resources.

Similar records from publications, herbarium specimens, and maps have been obtained for distribution outside the United States. For eastern Canada, the compiler consulted herbaria in Ottawa. The manuscript "Flora of Canada," by H. J. Scoggan, not yet published, was examined for valuable information on the distribution and northernmost records. The compiler visited Herbario Nacional, Instituto de Biología, Universidad Nacional Autónoma de México, in Mexico City, to copy locality records of specimens in that country.

Additional records were available in the Forest Service and Forest Service Herbarium. The unpublished maps compiled by George B. Sudworth have been reexamined for old records such as observations by foresters. Further information for many species was copied from specimens at the United States National Herbarium (US) of the National Museum of Natural History, Washington, D.C.

Maps of vegetation, forest types, topography, and landforms have been very helpful in determining lines along the borders of ranges. In mountainous States, sharp limits of forests and climatic zones of vegetation are based largely upon differences in altitude. Regrettably, maps of the same region sometimes differ in their classifications and type boundaries. Forest type maps in color have been issued by the Forest Survey of the Forest Service for nearly all forested parts of the country in many scattered publications, mostly on the forest resources of one State or a smaller unit. Detailed vegetation maps have been published for a number of States.

In this Atlas volume, the main source of vegetation boundaries has been the map Vegetation by A. W. Küchler, National Atlas Sheet No. 90 (U.S. Geological Survey 1970). This detailed, highly accurate map was reduced in size from a separately published one on the vegetation of conterminous United States with explanatory text (Küchler 1964). The map Forest Types, National Atlas Sheet No. 182, prepared by the Forest Service, has been useful and was reduced and adapted slightly for inclusion in the first volume as an overlay (overlay map 9, Major Forest Types).

Reduced or small-scale maps naturally do not show local variations of vegetation and plant distribution in detail. For example, a few small, isolated mountains with outlying stations for certain species

have been omitted both from vegetation maps and from this Atlas. Further local occurrences may be indicated by the State vegetation maps printed at larger scales.

In some Eastern States, the compiled maps are limited in detail to presence by counties, which are mostly small and numerous. Also, lack of a county record may indicate no collection rather than absence.

The compiler has had field experience in many parts of Eastern United States. Since 1942, he has been stationed in Washington, D.C., as the dendrologist. He collaborated with research foresters in preparation of publications on the woody plants of experimental forests located in Maine, New Hampshire, Virginia, and Mississippi, and in preparation of unpublished lists in other States. Earlier, he was a student, teacher, and research worker in Oklahoma and graduate student in Illinois and Michigan. Much information on landforms and vegetation has been obtained on field trips in various parts of the country and from airplane and car windows across the different States.

These maps have been prepared through the years along with other work by the compiler and an assistant. Sources of most locality records were indicated on the working maps and could be traced if necessary. However, detailed recordkeeping and reproduction of hundreds of dots on most maps (such as those made by computers) would have added greatly to the time and cost of preparation without increasing the accuracy and would have delayed publication.

For assistance in preparation of the maps, credit is due Barbara H. Honkala, research botanist, who also made the cover design, and to Kathy M. Robinson. The final maps were drafted by Charles F. Tyson and Ziya K. Akalin, engineering draftpersons.

EXPLANATION OF THE MAPS

Species maps of Volume 4 follow the general plan of Volume 1, from which this explanation is adapted and slightly condensed. However, like Volumes 2 and 3, the page size has been reduced slightly to 9¼ by 11¼ inches. The obvious advantages include lower costs and prices, less weight, and greater convenience in handling and storing. As the scale of the base maps of the United States is unchanged, the maps can be compared readily. Also, the 9 transparent overlays from Volume 1 can be adapted to Volumes 3 and 4, which have no overlays.

As in Volumes 1 and 3, there are base maps of the United States and North America, both without lettering. However, place names are given on 2 additional base maps inserted for reference. Base map 1 (in 2 parts, 1-NE and 1-SE) of Eastern United States has names of counties and adjacent Provinces of Canada and States of northern Mexico. Base map 2-N of North America shows names of States of the United States, Provinces and other subdivisions of Canada, States of Mexico, and names of additional countries.

The base map of the United States is the same, scale 1:10,000,000, Albers Conical Equal Area Projection—standard parallels 29½° and 45½°. Lines show State and county boundaries and boundaries of adjacent Provinces of Canada and States of Mexico. Crosses at 5-degree intervals mark latitude and longitude. Because of the reduced page size, however, this base has been trimmed into 2 smaller horizontal ones, northeastern and southeastern. One inch equals approximately 158 miles, and 1 centimeter, 100 kilometers.

The second base map, North America, is added for nearly all species whose natural range extends beyond the limits of the first. Thus, the entire distribution is included, with rare exceptions, such as species spreading into other continents. This one-page base map of

North America represents a reduction to about one-third the scale of the United States base, roughly 1:32,000,000. Thus, 1 inch equals about 500 miles, and 1 centimeter about 320 kilometers. State and national boundaries, principal rivers, and latitude and longitude are shown.

Base map 3, National Forest System and Related Data, shows the location of the 154 National Forests, which are widely distributed in 39 States and also 19 National Grasslands in 11 States. Comparisons with a tree species map will indicate the National Forest where that species may be expected. Many tree species occur also within specially managed areas, such as experimental forests and research natural areas.

List of Maps (pages iii-iv) cites the number and order of maps of the 166 tree species. For ready reference, the order is alphabetical by scientific name. Related species in the same genus are placed together. Index of Common Names and Index of Scientific Names follow the maps.

Of the 166 species mapped in this volume, 18 extend vertically onto the 2 bases of both northeastern and southeastern United States, shown on facing pages. The map of North America is added for 42 species whose natural range extends beyond northward into Canada or also Alaska or southward into Mexico or farther. (Additional maps for a few species were omitted, however.) There is a total of 226 pages of individual maps and 4 pages of base maps.

Where there is more than one for a species, the number is followed by letters for the base map: NE (Northeastern United States), SE (Southeastern United States), N (North America). If a species has 2, the maps are on facing pages. If 3, that of North America precedes or follows the others. To avoid separating maps of species, minor exceptions to alphabetical order were necessary, as noted under List of Maps.

The legend at the base of many maps contains additional notes. For species of local or limited distribution the names of States are mentioned. Occurrence beyond the map is also indicated. The latest known range of each species is summarized in words under Species Ranges (page 6). The Forest Service Check List (Little 1953) contained an earlier compilation.

The natural distribution or range of a tree species, as mapped in this Atlas, is the geographical area where the species, including any and all varieties, is native or wild. Varieties have not been plotted separately, and hybrids are omitted.

The distribution of the native tree species of the United States is mapped as of the present time, exclusive of changes caused directly or indirectly by Europeans. However, where modifications have occurred, the distribution is intended to be before Columbus, or pre-Columbian. For nearly all native tree species, the man-caused changes in range limits up to the present are believed to be negligible or recognizable. In the East, including agricultural and urban areas, sufficient scattered trees and secondary forests remain to show the natural distribution. However, total destruction has taken place in cities and artificial lakes.

These maps do not show where a species grows outside the natural range after having been introduced directly or indirectly by mankind, whether planted, escaped, adventive, or naturalized. Records of planted or introduced trees outside the continuous natural ranges have not knowingly been mapped. Reports of trees planted for forestry, shade, or other purposes and of escapes from cultivation have been omitted. Also excluded are naturalized trees, those introduced outside their natural range and thoroughly established and reproducing as though native.

Perhaps in the future, maps adding forest plantations or other successful introductions beyond the original occurrence may merit compilation. In the meantime, maps of Plant Hardiness Zones, such as overlay 4 of Volume 1 (Little 1971a; U.S. National Arboretum 1965), may suggest roughly where a species would be hardy when planted outside its natural range.

The natural geographic distribution of each species is shown as a brown-shaded pattern of fine dots on the black-and-white base map. Outlying stations or outliers are shown similarly by large or small dots according to size. However, the smallest areas, such as a grove with only a few trees, must be enlarged to a dot, representing several miles in diameter, to be visible on a map. Width of strips, such as along rivers, has been broadened slightly. A few localities beyond the main range, where a species is shown to have occurred naturally within historic times but is now extinct, are designated by X. Arrows have been added to direct attention to isolated dots.

Presence or absence is shown, but not abundance or density. Large areas within the main range where a species is known to be absent (for example, high mountains) are marked by borders or holes unshaded within. Commercial range, formerly indicated on some old maps, is not designated. Altitudinal limits, which vary in different latitudes, are not indicated.

The North American map of a species repeats on smaller scale the distribution pattern from the United States base. Additional dots beyond the main range in Canada and Mexico mostly are fewer and scattered and are enlarged for clarity.

The species maps do not indicate forest types, or forest cover types, which are the subject of overlay 9, Major Forest Types, Volume 1. Most tree species are not confined to a single forest type and have ranges somewhat beyond. However, many species are characteristic of and largely within certain broad types. Published colored maps of vegetation and forest types have been mentioned. Colored maps of forest types are contained in forest survey publications by the Forest Service for States. The comprehensive classification of forest cover types prepared by the Society of American Foresters (1954) lists species but lacks maps.

A few tree species have spread widely by planting or other introductions and have become so thoroughly naturalized that the limits of their original ranges are in doubt. *Catalpa bignonioides*, southern catalpa, is an illustration in this volume. Trees with edible seeds or other useful products may have been disseminated by the American Indians, for example, *Prunus angustifolia*, Chickasaw plum.

TREE NAMES

Scientific and common names follow the Forest Service Check List (Little 1953), except for several minor changes in nomenclature to be made in the forthcoming revision. Differences in scientific names, mostly of additions and deletions, are given below, the accepted name cited first. The first three changes below involve the substitution of an older specific name.

Avicennia germinans (L.) L., black-mangrove, replaces *A. nitida* Jacq.

Cladrastis kentukea (Dum.-Cours.) Rudd, yellowwood, replaces *C. lutea* (Michx. f.) K. Koch.

Sabal minor (Jacq.) Pers., dwarf palmetto, formerly omitted as a shrub, includes *S. louisiana* (Darby) Bomhard, Louisiana palmetto, a name applied to plants with trunks.

The 8 additions which follow include 7 large shrubs also reaching tree size and 1 (the last) formerly treated as a variety.

Aesculus parviflora Walt., bottlebrush buckeye, of Alabama and Georgia, becomes a small tree.

Cornus racemosa Lam., gray dogwood, becomes a small tree in Michigan.

Cornus rugosa Lam., roundleaf dogwood, becomes a small tree in Michigan.

Ilex amelanchier M. A. Curt., sarvis holly, a very rare and threatened species in the Southeastern United States, rarely is a small tree.

Styrax americana Lam., American snowbell, becomes a small tree.

Styrax platanifolia Engelm., sycamore-leaf snowbell, of Texas, becomes a small tree.

Viburnum trilobum Marsh. (*V. opulus* L. var. *americanum* Ait.), American cranberrybush, becomes a small tree.

Zanthoxylum hirsutum Buckl., Texas Hercules-club, formerly regarded as a variety, *Z. clava-herculis* L. var. *fruticosum* (Gray) Wats.

The last 16 names involve omission or deletion, mostly through union of 2 species. The second of 2 species, both accepted in the 1953 Check List, has been united and reduced to a synonym or variety of the first.

Amelanchier alnifolia (Nutt.) Nutt., western serviceberry, formerly saskatoon serviceberry, includes *A. florida* Lindl., Pacific serviceberry.

Amelanchier arborea (Michx. f.) Fern., downy serviceberry, includes as a variety *A. arborea* var. *cordifolia* (Ashe) Boivin (var. *laevis* (Wieg.) Ahles, *A. laevis* Wieg.), Allegheny serviceberry.

Cyrilla racemiflora L., swamp cyrilla, includes as varieties or synonyms *C. parvifolia* Raf., littleleaf cyrilla, and *C. arida* Small, Florida cyrilla.

Ilex decidua Walt., possumhaw, includes *I. longipes* Chapm., Georgia holly.

Malus coronaria (L.) Mill., sweet crab apple, includes as a synonym *M. glabrata* Rehd., Biltmore crab apple.

Osmanthus americanus (L.) Benth. & Hook., f., devilwood, includes as a variety *O. americanus* var. *megacarpus* (Small) P. S. Green (*O. megacarpus* (Small) Small), bigfruit osmanthus, of Florida.

Persea borbonia (L.) Spreng., redbay, includes as a variety *P. borbonia* var. *humilis* (Nash) Kopp (*P. humilis* Nash), silkbay, and as a synonym *P. littoralis* Small, shorebay, both of Florida.

Prunus mexicana Wats., Mexican plum, includes *P. americana* Marsh. var. *lanata* Sudw., inch plum.

Ptelea trifoliata L., common hoptree, includes as synonyms or varieties *Pt. angustifolia* Benth., narrowleaf hoptree, and *Pt. pallida* Greene, pale hoptree.

Quercus prinoides Willd., chinkapin oak, formerly known as dwarf chinkapin oak, includes as a variety or synonym *Q. muehlenbergii* Engelm. The map of the latter (Atlas, Volume 1, 173-E, 173-W) contains the range of the former and is not repeated here.

Salix exigua Nutt., coyote willow, includes as a variety *S. interior* Rowlee, sandbar willow.

Salix nigra Marsh., black willow (Atlas, Volume 1, maps 190-N, 190-W, and 190-E), includes *S. gooddingii* Ball, Goodding willow, of Southwestern United States and adjacent Mexico. The map with revised western range (Atlas, Volume 3, 177-NW, 177-SW) is not repeated here.

Salix rigida Mühl., Missouri River willow, replaces *S. eriocephala* Michx., but is omitted as a shrub.

Sambucus canadensis L., American elder, includes *S. simpsonii* Rehd., Florida elder.

Sapindus saponaria L., wingleaf soapberry, includes *S. marginatus* Willd., Florida soapberry.

Tilia caroliniana Mill., Carolina basswood, includes as a synonym *T. floridana* Small, Florida basswood.

SPECIES MAPS AND RANGES

The natural distribution of each species of minor eastern hardwoods in this volume is shown on a map (Species Maps 1-166) and is stated below in words concisely for reference. Ranges have been compiled from these maps for this volume and for the forthcoming revision of the Forest Service Check List. Thus, the summaries here replace those of the 1953 Check List.

Ranges are given in outline form, as in previous check lists. Most place names have been abbreviated. The States and Canadian provinces along the corners and irregular limits of distribution have been listed, generally from northeast to northwest, southwest, and southeast. However, ranges of species confined to the Coastal Plain of southeastern United States are cited from northeast to southeast and southwest. In many cases, the Atlantic Ocean and Gulf of Mexico form natural boundaries on one side. Portions of States, especially large ones, along the corners and limits have been mentioned where the distribution within those States is not widespread.

Distribution is more or less continuous in a line connecting the States named. Isolated stations, which are shown on the maps, are not noted. Counties or other geographical divisions have been cited in a few instances, mostly trees of local or restricted occurrence.

Entire ranges of species also occurring outside continental United States have not been given in detail. For the trees extending southward in Mexico, the Mexican States forming the outlines have been cited where known. Likewise, presence is noted in the West Indies and specifically in Puerto Rico and the Virgin Islands, Central America, and South America.

The species are arranged by map number, mostly in alphabetical order.

1. *Acer barbatum* Michx., Florida maple. Coastal Plain and Piedmont from se. Va. sw. to c. Fla. and e. Tex., and n. in Miss. Valley to n. Ark. and e. Okla. Local in c. Okla.

2. *Acer leucoderme* Small, chalk maple. Rare and local from N. C. and e. Tenn. s. to nw. Fla. and w. to La., e. Tex., sw. Ark., and se. Okla.

3-N, 3-NE. *Acer pensylvanicum* L., striped maple. Nova Scotia and Gaspé Peninsula of Que., w. to s. Ont. and n. Mich., s. to ne. Ohio, Pa., and N. J., and in mts. to n. Ga.

4-N, 4-NE. *Acer spicatum* Lam., mountain maple. Nfld., s. Labr., and c. Que., w. to c. Ont. and e. Sask., s. to Minn. and ne. Iowa, and e. to s. Wis., Ohio, Pa., and New Engl. Also s. in mts. to n. Ga.

5. *Aesculus parviflora* Walt., bottlebrush buckeye. Local in Ala. and sw. Ga.

6. *Aesculus pavia* L., red buckeye. Coastal Plain from se. N. C. se. to n. Fla. and w. to e. and c. Tex. to Edwards Plateau, and n. in Miss. Valley to se. Okla., se. Mo., and s. Ill.

7. *Aesculus sylvatica* Bartr., painted buckeye. Coastal Plain and outer Piedmont from se. Va. se. to c. Ga. and ne. Ala., and n. to e. Tenn.

8. *Alnus maritima* (Marsh.) Mühl., seaside alder. Local in s. Del. and e. shore of Md. and in s. Okla. (Pontotoc and Johnston Cos.)

9-N, 9-NE. *Alnus rugosa* (Du Roi) Spreng., speckled alder. Nfld. and Labr. w. to Hudson Bay, Mack., and Yukon, s. to c. B. C., ne. N. Dak., and e. to Minn., ne. Iowa, ne. Ill., and n. N. J., and s. in mts. to W. Va.

10-NE, 10-SE, 10-N. *Alnus serrulata* (Ait.) Willd., hazel alder. Sw. N. S., s. N. B., and c. Maine, w. to N. Y., Ohio, Ind., Mo., and extreme se. Kans., s. to e. Okla. and e. Tex., and e. to n. Fla.

11-N, 11-NE, 11-SE. *Amelanchier arborea* (Michx. f.) Fern., downy serviceberry. S. Nfld., N. S., N. B., s. Que., and Maine, w. to s. Ont., n. Mich., and e. Minn., s. to extreme se. Nebr., e. Kans., e. Okla., and La., and e. to n. Fla.

12-N, 12-NE. *Amelanchier alnifolia* (Nutt.) Nutt., western serviceberry. C., s., and se. Alaska, Yukon, and Mack., s. to n. Calif., and e. to Colo., Nebr., nw. Iowa, w. Minn., and Man. Local e. in s. Ont. and sw. Que.

13. *Amelanchier interior* Nielsen, inland serviceberry. N. Mich., Wis., Minn., e. Iowa, and n. Ill.

14. *Amelanchier sanguinea* (Pursh) DC., roundleaf serviceberry. Maine and sw. Que. w. to s. Ont., Mich., and n. Minn., s. to n. Iowa, Ohio, Pa., n. N. J., and Mass. Also s. in mts. to w. N. C., and e. Tenn.

15. *Aralia spinosa* L., devils-walkingstick. N. J. and c. and w. N. Y., w. to s. Ohio, s. Ill., and se. Mo., s. to se. Okla. and e. Tex., and e. to c. Fla. Also escaping from cult. from s. New Engl. to Mich. and naturalized locally in Conn. and perhaps elsewhere.

16. *Asimina triloba* (L.) Dunal, pawpaw. Pa. and w. N. Y., w. to extreme s. Ont., s. Mich., n. Ill., s. Iowa, and se. Nebr., s. to e. Kans. and e. Tex., and e. to s. La., nw. Fla., and Ga. Also extinct in N. J., sw. Wis., and ne. Iowa.

17-N, 17-SE. *Avicennia germinans* (L.) L., black-mangrove. Silt shores of coasts and islands of s. to n. Fla., including Fla. Keys, s. Miss., s. La., and s. Tex., northward local and not hardy. Also widely distributed on coasts of tropical America in West Indies, including Bermuda, Bahamas, P. R., and V. I. Mex., C. Am., and S. Am. (A closely related species in tropical w. Africa.)

18-NE, 18-SE. *Baccharis halimifolia* L., eastern baccharis. Coastal Plain, generally near coast, from Mass. s. to s. Fla. incl. Fla. Keys, w. to s. Tex., and n. in Miss. Valley to se. Okla., Ark., and n. Miss. Also Bahamas and a var. in Cuba.

19. *Betula uber* (Ashe) Fern., Ashe birch. Very local in sw. Va. (Smyth Co.), classed as extinct until rediscovered in 1975. Regarded also as an artificial hybrid and perhaps to be excluded.

20. *Bumelia lanuginosa* (Michx.) Pers., gum bumelia. C. Fla. and Ga. w. to s. Miss., La., and in Miss. Valley to s. Ill., c. Mo., e. and s. Kans., and w. and s. Tex., and s. to ne. Mex. (Coah., N. L., and Tamps.). Also a var. in extreme sw. N. Mex., se. Ariz., and ne. Son.

21. *Bumelia lycioides* (L.) Pers., buckthorn bumelia. Coastal Plain from se. Va. s. to n. Fla., w. to se. Tex., and n. in Miss. Valley to se. Mo., s. Ill., s. Ind., c. Ky., and e. Tenn.

22. *Bumelia tenax* (L.) Willd., tough bumelia. Coastal Plain of S. C., mostly near coast, se. and s. Ga., s. to s. Fla.

23. *Carya floridana* Sarg., scrub hickory. Local in c. Fla. (Volusia and Marion Cos., s. to Charlotte and Palm Beach Cos.).

24. *Carya pallida* (Ashe) Engl. & Graebn., sand hickory. Coastal Plain from s. N. J. and Del. s. to Ga., w. to nw. Fla. and se. La., and n. in Miss. Valley to Tenn., se. Ky., s. Ill., and sw. Ind. Also recorded from Conn.

25. *Carya texana* Buckl., black hickory. Sw. Ind., c. Ill., Mo., and se. Kans., s. to c. Okla., Edwards Plateau and s. Tex., and La.

26. *Castanea alnifolia* Nutt., Florida chinkapin. Coastal Plain from N. C. to n. Fla. and se. La.

27-NE, 27-NE. *Castanea dentata* (Marsh.) Borkh., American chestnut. S. Maine w. to N. Y., extreme s. Ont., and se. Mich., s. to Ohio, s. Ind., extreme s. Ill., s. to s. Miss. and sw. Ga. Formerly also nw. Fla. Almost exterminated nearly half century ago by the chestnut blight fungus, but stump sprouts persist.

28. *Castanea ozarkensis* Ashe, Ozark chinkapin. Local in Ozark Plateau of s. Mo., Ark., and e. Okla.

29. *Castanea pumila* Mill., Allegheny chinkapin. N. J. and s. Pa., sw. to extreme e. Ky., Tenn., Ark., and se. Okla., and s. to e. Tex. and c. Fla. Also local in s. Ohio.

30. *Catalpa bignonioides* Walt., southern catalpa. Native probably in sw. Ga., nw. Fla., Ala., and Miss., the original distribution uncertain. Widely naturalized from s. New Engl. and N. Y., w. to Ohio, s. Mich., Mo., and Okla., and s. to e. Tex. and Fla.

31. *Celtis tenuifolia* Nutt., Georgia hackberry. Pa. and extreme s. Ont., w. to Ind., Mo., and se. Kans., and s. to e. Tex. and n. Fla.

32-NE, 32-SE, 32-N. *Cephalanthus occidentalis* L., common buttonbush. Sw. N. S., s. N. B., and Maine, w. to s. Que., s. Ont., and se. Minn., s. to w. Kans. and Trans-Pecos and s. Tex., and e. to s. Fla., and in Ariz. and Calif. Also s. in Mex. and C. Amer. to Hond., and in Cuba. The same or a closely related species also in e. Asia.

33-W, 33-NE, 33-SE. *Cercis canadensis* L., eastern redbud. N. J. and Pa., w. to s. Mich. and se. Nebr., s. to Trans-Pecos and s. Tex., and e. to c. Fla. Also n. Mex. (e. Chih. and Coah., e. to Tamps., and s. to S. L. P. and Hgo.). Extinct at 1 locality in extreme sw. Ont.

34. *Chionanthus virginicus* L., fringetree. S. N. J. and s. Pa., w. to s. Ohio, e. Ky., and s. Mo., s. to se. Okla. and e. Tex., and e. to c. Fla.

35. *Cladrastis kentukea* (Dum.-Cours.) Rudd, yellowwood. Rare and local in extreme sw. Va., Ky., s. Ind., s. Ill., sw. Mo., and e. Okla., and e. in Ark., Tenn., Miss., Ala., extreme n. Ga., and w. N. C.

36. *Clethra acuminata* Michx., cinnamon clethra. Mts. of W. Va., w. Va., e. Ky., e. Tenn., w. N. C., extreme nw. S. C., and extreme n. Ga.

37. *Cliftonia monophylla* (Lam.) Britton, buckwheat-tree. Coastal Plain from se. Ga. and n. Fla., w. to se. La.

38-NE, 38-SE, 38-N. *Cornus alternifolia* L. f., alternate-leaf dogwood. Nfld. and se. Que. w. to Maine, s. Ont., Minn., and s. Man., s. to Mo., n. Ark., Miss., nw. Fla., and Ga.

39. *Cornus drummondii* C. A. Meyer, roughleaf dogwood. Extreme s. Ont., Ohio, and s. Mich., w. to Iowa, se. S. Dak., and c. Nebr., s. to c. and se. Tex., and e. to s. La. and Miss.

40-N, 40-NE. *Cornus rugosa* Lam., roundleaf dogwood. N. S., N. B., s. Que., and Maine, w. to s. Ont., n. Mich., Minn., and se. Man., and s. to Iowa, n. Ind., n. Ky., Pa., and N. J. and in mts. to W. Va. and sw. Va.

41. *Cornus racemosa* Lam., gray dogwood. Maine and s. Ont. w. to n. Mich., Minn., and s. Man., s. to N. Dak., e. S. Dak., n. Nebr., Mo., and n. Ark., and e. to Tenn., and N. C.

42. *Cornus stricta* Lam., stiffcornel dogwood. Chiefly in Coastal Plain from Va. to c. Fla. and e. Tex., n. in Miss. Valley to se. Okla., se. Mo., c. Ill., s. Ind., and Ky.

43-N, 43-NE. *Cornus stolonifera* Michx., red-osier dogwood. Very widely distributed from Nfld. and Labr., w. across Can. and n. contiguous U.S. to Yukon and c. Alaska, s. in w. mts. to c. Calif., s. Ariz., and s. N. Mex., and e. from Nebr. to s. Ill., W. Va., n. Va., and n. N. J. Also mts. of n. Mex. (Chih., Dgo., and N. L.).

44-N, 44-NE. *Corylus cornuta* Marsh., beaked hazel. Nfld., N. S., and s. Que., w. across s. Can. to c. B. C., s. in Pacific Coast region to w. Wash., w. Oreg., and in Coast Ranges and Sierra Nevada to c. Calif., e. in mts. of Colo., and from ne. Wyo. and Black Hills e. to ne. Iowa, Wis., Pa., and n. N. J., and s. mostly in Appalachian Mts. to n. Ga. and ne. Ala.

45-N, 45-SE. *Cyrilla racemiflora* L., swamp cyrilla. Coastal Plain from se. Va. to c. Fla. and w. to se. Tex. Also West Indies in mts.

from Cuba to P. R. and Lesser Antilles, Atlantic Coast of C. Am. in Belize and Nicaragua, and n. S. Am. from Guyana to Venezuela, Colombia, and Brazil.

46. *Cotinus obovatus* Raf., American smoketree. Rare and local in mts. of se. Tenn. and n. Ala., Ozark Plateau of sw. Mo., Ark., and e. Okla., and Edwards Plateau of c. Tex. Also Ky. (Davies Co.), perhaps introduced.

47. *Elliottia racemosa* Mühl., eliottia. Very rare and local in e. and se. Ga. (Columbia, Burke, Screven, Bullock, Candler, Telfair, Coffee, and Turner Cos.) Formerly Richmond Co. and also S. C. (Aiken Co.) but extinct at those and perhaps other localities.

48-N, 48-SE. *Erythrina herbacea* L., eastern coralbean. Coastal Plain from se. N. C. and S. C. to s. Fla. including Fla. Keys, and w. to e. and s. Tex. Also e. Mex. (Tamps. s. to Pue., Oax., and Ver.) A tree in U.S. only in s. Fla. including Fla. Keys, and shrubby or herbaceous northward.

49-NE, 49-SE. *Euonymus atropurpureus* Jacq., eastern wahoo. C. N. Y. and extreme s. Ont., w. to s. Mich., c. Wis., c. Minn., and se. N. Dak., s. to e. Nebr., c. Okla., and c. Tex., e. to Ark., Miss., and Ga., and n. to N. J.

50. *Forestiera acuminata* (Michx.) Poir., swamp-privet. Coastal Plain chiefly from s. S. C. to n. Fla. and w. to e. Tex., and n. in Miss. Valley to e. Okla., extreme se. Kans., ne. Mo., c. Ill., sw. Ind., and c. Tenn.

51. *Forestiera segregata* (Jacq.) Krug & Urban, Florida-privet. Along and near coasts from se. Ga. and ne. Fla. s. to Fla. Keys and n. on Gulf Coast to w. Fla. (Levy Co.). Also in Bermuda and widespread through West Indies including Bahamas, P. R., and V. I.

52. *Franklinia alata* Bartr., franklinia. Extinct as native and known only in cultivation. Originally occurring at a single locality near Fort Barrington, McIntosh Co., near the coast of se. Ga., where it was discovered by John and William Bartram in 1765. It has not been found growing wild since 1790. The original colony probably was exterminated by transplanting to cultivation.

53. *Fraxinus caroliniana* Mill., Carolina ash. Coastal Plain from ne. Va. to s. Fla. and w. to se. Tex. and s. Ark. Also a var. in Cuba.

54. *Fraxinus profunda* (Bush) Bush, pumpkin ash. Local in swamps and river bottoms, chiefly in Coastal Plain from s. Md. and se. Va. s. to n. Fla. and w. to La., and n. in Miss. Valley to se. Mo., s. Ill., Ind., and sw. Ohio.

55. *Gleditsia aquatica* Marsh., waterlocust. Coastal Plain from S. C. to c. Fla. and w. to e. Tex., and n. in Miss. Valley to Mo., s. Ill., extreme sw. Ind., and w. Ky. Not recorded from Ala.

56. *Gordonia lasianthus* (L.) Ellis, loblolly-bay. Coastal Plain from e. N. C. to c. Fla. and s. Miss.

57. *Gymnocladus dioicus* (L.) K. Koch, Kentucky coffeetree. C. N. Y. and extreme s. Ont. w. to s. Mich., s. Minn., and extreme se. S. Dak., s. to c. Kans. and w. Okla., and e. to Ark., nw. Miss., c. Tenn., Ky., sw. Va., and s. Pa. Also naturalized eastward.

58. *Halesia carolina* L., Carolina silverbell. Mostly in mts. from sw. Va., s. W. Va., and s. Ohio, w. to extreme s. Ill., and s. to w. Tenn., Ala., n. Fla., and n. to N. C. Also in Ark. and se. Okla.

59. *Halesia diptera* Ellis, two-wing silverbell. Coastal Plain from extreme s. S. C. and Ga. to nw. Fla., w. to se. Tex. and s. Ark. (Nevada Co.).

60. *Halesia parviflora* Michx., little silverbell. Local, chiefly in Coastal Plain, S. C. (Saluda Co.), Ga., n. Fla., Ala., and Miss.

61-N, 61-NE, 61-SE. *Hamamelis virginiana* L., witch-hazel. N. S., N. B., Maine, and s. Que., w. to s. Ont., n. Mich., and se. Minn., s. to e. Iowa, Ark., se. Okla., and Edwards Plateau and se. Tex., and e. to c. Fla. Also in ne. Mex. (Tamps.)

62. *Ilex ambigua* (Michx.) Torr., Carolina holly. Coastal Plain,

chiefly, from N. C. to c. Fla. and e. Tex., n. to se. Okla., n. Ark., and n. Ala.

63. *Ilex amelanchier* M. A. Curt., sarvis holly. Rare and local in Coastal Plain in N. C., S. C., Ga., Ala., Miss., and se. La.

64-N, 64-SE. *Ilex cassine* L., dahoon. Coastal Plain, mostly near coast, from se. N. C. to s. Fla. and w. to s. La. Recorded long ago from se. Tex. (Brazoria Co.). Also local in Bahamas, w. Cuba, and ne. P. R., and a var. in c. Mex. (Ver. and Mex.).

65. *Ilex coriacea* (Pursh) Chapm., large gallberry. Coastal Plain from se. Va. to n. Fla. and w. to se. Tex.

66. *Ilex decidua* Walt., possumhaw. Md. and Va., s. in Coastal Plain and Piedmont to c. Fla., and w. to se. and c. Tex., and n. in interior to e. Okla., se. Kans., ne. Mo., c. Ill., se. Ind., w. Ky., and se. Tenn. Also ne. Mex. (Tamps. and N. L.).

67. *Ilex laevigata* (Pursh) Gray, smooth winterberry. Sw. Maine to c. N. Y., and s., mostly in Coastal Plain, to sw. Pa., sw. Va., and ne. S. C.

68. *Ilex montana* Torr. & Gray, mountain winterberry. Mts. mostly, from w. Mass. and c. and sw. N. Y., s. to e. Ky., c. Tenn., n. Ga., and S. C. Also local s. and w. to nw. Fla., s. Ala., Miss., and La. Also a var. or closely related sp. in Japan.

69. *Ilex myrtifolia* Walt., myrtle dahoon. Coastal Plain from N. C. to c. Fla. and w. to se. La. Recorded long ago from se. Tex.

70-N, 70-NE, 70-SE. *Ilex verticillata* (L.) Gray, common winterberry. Nfld., P. E. I., N. S., N. B., s. Que., and Maine, w. to s. Ont., n. Mich., and ne. Minn., s. to ne. Iowa, se. Mo., Ark., and se. La., and e. to n. Fla.

71-N, 71-SE. *Ilex vomitoria* Ait., yaupon. Coastal Plain from se. Va. to c. Fla. and w. to s. and c. Tex., and n. to extreme se. Okla., sw. Ark., n. Miss., and n. Ala. Also a variation in s. Mex. (Chis.). Naturalized in Bermuda.

72-N, 72-NE. *Illicium floridanum* Ellis, Florida anise-tree. Coastal Plain of nw. Fla. to c. Ala., s. Miss., and se. La. Also ne. Mex. (Tamps.)

73. *Illicium parviflorum* Michx., yellow anise-tree. Rare and local in c. Fla. (Volusia, Marion, Lake, Seminole, and Polk Cos.).

74. *Leitneria floridana* Chapm., corkwood. Rare and local in Coastal Plain in s. Ga., n. Fla., se. Tex., e. Ark., and se. Mo.

75-NE, 75-SE. *Kalmia latifolia* L., mountain-laurel. Se. Maine w. to N. Y., Ohio, and s. Ind., s. to w. Tenn., e. Miss., and se. La., and e. to n. Fla. and Ga.

76. *Lyonia ferruginea* Nutt., tree lyonia. Coastal Plain of extreme s. S. C. and se. Ga. to s. and nw. Fla.

77. *Magnolia ashei* Weatherby, Ashe magnolia. Local in nw. Fla. (8 cos. from Leon and Wakulla Cos. w. to Okaloosa Co.).

78. *Magnolia fraseri* Walt., Fraser magnolia. Mts. in w. Va., W. Va., e. Ky., e. Tenn., n. Ga., nw. S. C., and w. N. C.

79. *Magnolia macrophylla* Michx., bigleaf magnolia. Rare and local from c. N. C. to extreme sw. Va., e. Ky., and c. Tenn., s. to n. and se. La., s. Miss., s. Ala., and w. Ga. Also local in s. Ohio (Jackson Co.), nw. Ark. (Clay Co.), and se. S. C. (Dorchester and Charleston Cos.).

80. *Magnolia pyramidata* Bartr., pyramid magnolia. Coastal Plain chiefly, from e. Ga. w. to nw. Fla., c. Ala., s. Miss., La., and se. Tex. Also local in S. C. (Richmond Co.).

81. *Magnolia tripetala* L., umbrella magnolia. S. Pa. w. to s. Ohio and s. Ind. (Crawford Co.), s. to c. Tenn., se. Miss., nw. Fla., and Ga. Also local in Ozark Plateau of Ark. and se. Okla. (Le Flore Co.).

82. *Malus angustifolia* (Ait.) Michx., southern crab apple. Coastal Plain chiefly, from s. N. J., Del., and Md., s. to n. Fla., and w. to s. La. and se. Tex., and n. to n. Ark., s. Ill., and w. Ky. Also local in s. Ohio and W. Va.

83. *Malus coronaria* (L.) Mill., sweet crab apple. C. N. Y. w. to s. Ont., c. Mich., and n. Ill., s. to w. Mo. and ne. Ark., and e. to n. Ala., n. Ga., w. N. C., se. Va., and N. J.

84. *Malus ioensis* (Wood) Britton, prairie crab apple. N. Ind. to s. Wis., se. Minn., and extreme se. S. Dak., s. to se. Nebr., e. Kans., e. Okla., and Ark. Also local in Edwards Plateau of c. Tex. and in La.

85. *Myrica cerifera* L., southern bayberry. Coastal Plain from s. N. J., Del., and s. Md., s. to s. Fla. including Fla. Keys. and w. to s. and c. Tex., and n. to extreme se. Okla., c. Ark., and c. Miss. Also in Bermuda, Bahamas, Cuba, Hispaniola, and P. R. and in Mex. and C. Am. from Belize s. to Costa Rica.

86. *Myrica heterophylla* Raf., evergreen bayberry. Coastal Plain from s. N. J., se. Pa., and Del. s. to n. Fla., and w. to La. and c. Ark. and n. Ala.

87. *Myrica inodora* Bartr., odorless bayberry. Coastal Plain of sw. Ga., nw. Fla., s. Ala., s. Miss., and se. La.

88-N, 88-NE. *Myrica pensylvanica* Loisel., northern bayberry. Near coast chiefly, from s. Nfld., N. S., P. E. I., and s. Que., se. to s. Maine, Mass., N. J., se. Va., and e. N. C., and w. locally to w. Pa., ne. Ohio, and extreme s. Ont.

89. *Aemopanthus collinus* (Alexander) R. C. Clark, mountain-holly. Rare and local in mts. of e. W. Va., sw. Va., and w. N. C.

90. *Osmanthus americanus* (L.) Benth. & Hook. f., devilwood. Coastal Plain from se. Va. and e. N. C. to c. Fla., and w. to se. La. Also Mex. (N. L., Tamps., Ver., Oax.).

91. *Oxydendrum arboreum* (L.) DC., sourwood. Sw. Pa. to s. Ohio and s. Ind., s. to w. Ky., w. Tenn., Miss., and La., e. to nw. Fla., and n. to e. Ga., se. Va., and se. Md.

92. *Persea borbonia* (L.) Spreng., redbay. Coastal Plain from s. Del., se. Md., and se. Va., s. to s. Fla., including Fla. Keys, and w. to La. and e. and s. Tex., also sw. Ark. (Miller Co., apparently extinct). Also Bahamas (Grand Bahama Is.).

93. *Pinckneya pubens* Michx., pinckneya. Rare in Coastal Plain of extreme s. S. C. (Beaufort Co.), Ga., and n. and nw. Fla.

94. *Planera aquatica* J. F. Gmel., planertree. Coastal Plain from se. N. C. to n. Fla. and w. to e. Tex., and n. in Miss. Valley to se. Okla., Ark., se. Mo., s. Ill., w. Ky., and w. Tenn.

95-NE, 95-SE. *Prunus americana* Marsh., American plum. Widespread from N. H. and Vt. w. to N. Y., s. Ont., n. Mich., Minn., s. Man., se. Sask., and Mont., s. in mts. to N. Mex. and in e. from Okla. to ne. Fla.

96. *Prunus alleghaniensis* Porter, Allegheny plum. Mts. from c. Pa. s. to e. W. Va., also local in ne. Tenn. and in Conn.

97. *Prunus angustifolia* Marsh., Chickasaw plum. Mo. w. to Kans., s. Nebr., and extreme se. Colo., s. to extreme e. N. Mex., Tex., and La. Also naturalized e. to c. Fla. and n. to N. J., W. Va., s. Ohio, and Ill. Extensively naturalized and perhaps spread by Indians in prehistoric times. The original native range thus is not accurately known but probably was c. Tex. and Okla., according to Sargent (1926, p. 570).

98. *Prunus caroliniana* (Mill.) Ait., Carolina laurelcherry. Coastal Plain from se. N. C. to c. Fla. and w. to e. Tex.

99. *Prunus hortulana* Bailey., hortulan plum. Sw. Ohio to n. Ill., se. Iowa, Mo., and e. Kans., s. to ne. Okla., n. Ark., and n. Ky. Also e. Tenn. and W. Va., perhaps an escape.

100-N, 100-SE. *Prunus mexicana* Wats., Mexican plum. S. Ohio and Ky., w. to n. Mo., sw. Iowa, n. Nebr., and se. S. Dak., s. to c. and s. Tex., and e. to Ala. Also ne. Mex. (Coah. and N. L.).

101. *Prunus munsoniana* Wight & Hedr., wildgoose plum. Sw. Ohio and Ky., w. to s. Ill., n. Mo., and se. Kans., s. to c. Tex., and e. to n. La., Miss., and e. Tenn. Also naturalized e. to Ga.

102. *Prunus nigra* Ait., Canada plum. Maine and s. Que. w. to s. Ont., n. Mich., n. Minn., and se. Man., and s. to ne. Iowa. Ill., n. Ohio, N. Y., and Conn. Also s. N. B. and introduced in N. S.

103-N, 103-NE. *Prunus pensylvanica* L. f., pin cherry. Nfld. and Labr. w. across Can. to s. Mack. and B. C., s. in Rocky Mts. to Mont. and Colo., Black Hills, and s. in e. from S. Dak. to Ill. Pa., and N. J. and in Appalachian Mts. to n. Ga. and e. Tenn.

104-N, 104-NE. *Prunus virginiana* L., common chokecherry. Nfld., N. S., and s. Que., w. across Can. to s. Mack. and n. B. C., s. from Wash. to s. Calif., e. to Trans-Pecos and nw. Tex., Mo., and N. J., and s. in Appalachian Mts. to w. N. C. and e. Tenn.

105. *Prunus umbellata* Ell., flatwoods plum. Coastal Plain, chiefly, from s. N. C. s. to c. Fla., w. to e. Tex., and n. to s. Ark.

106-N, 106-NE, 106-SE. *Ptelea trifoliata* L., common hoptree. N. J. and w. N. Y., w. to extreme s. Ont., c. Mich., s. Wis., se. Iowa, e. Kans., and in mts. to s. Colo. and s. Utah, s. to Ariz., Tex., and s. Fla. Also local in s. Que., perhaps introduced. Also Mex. (ne. Son. e. to Tamps., s. to Gro. and Oax.).

107. *Quercus arkansana* Sarg., Arkansas oak. Coastal Plain, chiefly, in sw. Ga., nw. Fla., Ala., se. La., and sw. Ark.

108. *Quercus chapmanii* Sarg., Chapman oak. Coastal Plain from extreme s. S. C. and se. Ga. to s. and nw. Fla. and s. Ala.

109. *Quercus durandii* Buckl., Durand oak. Coastal Plain, chiefly, from N. C. to n. Fla. and w. to s. and c. Tex., and n. to s. Okla., s. Ark., and n. Ala. Also ne. Mex. (Coah. and Tamps.).

110. *Quercus georgiana* M. A. Curtis, Georgia oak. Rare and local in S. C., n. Ga., and n. Ala.

111. *Quercus ilicifolia* Wangenh., bear oak. S. Maine w. to N. Y., s. to Pa., Md., and Del., and in mts. to e. W. Va., sw. Va., and w. N. C.

112. *Quercus imbricaria* Michx., shingle oak. Pa. w. to s. Mich., n. Ill., and s. Iowa, s. to e. Kans. and Ark., and e. to Tenn., N. C., Md., and Del. Also local in La. and Ala.

113. *Quercus incana* Bartr., bluejack oak. Coastal Plain from se. Va. to c. Fla. and w. to La. and e. and c. Tex., and n. to se. Okla. and sw. Ark.

114. *Quercus laevis* Walt., turkey oak. Coastal Plain from se. Va. to c. Fla. and w. to se. La.

115. *Quercus myrtifolia* Willd., myrtle oak. Coastal Plain from s. S. C. to s. Fla. and w. to s. Miss.

116. *Quercus oglethorpensis* Duncan, Oglethorpe oak. Local in w. S. C. (Edgefield, Greenwood, McCormick, and Saluda Cos.) and ne. Ga. (Elbert, Greene, Jasper, and Wilkes Cos.).

117-N, 117-SE. *Rhamnus caroliniana* Walt., Carolina buckthorn. Extreme s. Ohio w. to s. Ill. and c. Mo., s. to e. Okla. and c. and e. Tex., e. to c. Fla., and n. to c. S. C. and sw. Va. Also ne. Mex. (Tamps. and N. L.).

118. *Rhododendron catawbiense* Michx., Catawba rhododendron. Mts. and Piedmont from w. Va., s. W. Va., and e. Ky., s. to e. Tenn., ne. Ala., n. Ga., nw. S. C., and e. N. C.

119. *Rhododendron maximum* L., rosebay rhododendron. W. Maine to Vt. and w. N. Y., s. mostly in mts. to s. Ohio, e. Ky., e. Tenn., n. Ga., nw. S. C., w. N. C., and N. J. Extinct in s. Ont. Reported from N. S. in 1877 but not found there afterwards.

120-NE, 120-SE. *Rhus copallina* L., shining sumac. Sw. Maine w. to N. Y., s. Ont., c. Mich., and c. Wis., s. to se. Iowa, extreme se. Nebr., e. Kans., c. Okla., and c. Tex., e. to s. Fla.

121-NE, 121-SE. *Rhus glabra* L., smooth sumac. Very widely distributed in all 48 contiguous States (though at only 2 localities in Nev. and collected only once in Calif.). C. Maine w. to extreme s. Que., s. Ont., n. Minn., e. N. Dak., Man., and e. Sask., s. to nw.

and c. Tex., and e. to nw. Fla. Also scattered and mostly in mts. in w. from s. B. C. and w. Wash., s. to se. Ariz. and s. N. Mex. Also local in n. Mex. (Son., Chih., and Tamps.).

122-N, 122-NE. *Rhus typhina* L., staghorn sumac. N. S. (Cape Breton Is.), P. E. I., N. B., s. Que., and Maine, w. to s. Ont., n. Mich., and n. Minn., s. to c. Iowa, c. Ill., w. Tenn., n. Ala., n. Ga., and nw. S. C., and n. to Md. and N. J.

123. *Robinia kelseyi* Hutchins., Kelsey locust. Local in mts. of w. N. C., e. Tenn., and extreme se. Ky.

124. *Robinia viscosa* Vent., clammy locust. Mts. and Piedmont from w. Va. sw. to extreme se. Ky., w. N. C., c. S. C., e. Tenn., and c. Ala.

125. *Sabal minor* (Jacq.) Pers., dwarf palmetto. Coastal Plain from ne. N. C. s. to s. Fla., and w. to e. and c. Tex., and n. to extreme se. Okla. and s. Ark.

126. *Salix caroliniana* Michx., Coastal Plain willow. S. Pa. w. to n. Mo. and extreme se. Nebr., s. to e. Kans., s. Okla., and c. Tex., e. to s. Fla. including Fla. Keys, and in Coastal Plain to se. Va. Also Cuba.

127-N, 127-NE. *Salix bebbiana* Sarg., Bebb willow. Widespread from Nfld. and Labr. w. across Can. to Hudson Bay, Yukon, and c. and sw. Alaska, s. to B. C. and in mts. from Wash. to c. Ariz., s. N. Mex., and nw. Nebr., and s. in ne. from Iowa e. to Ind., Pa., Md., and N. J. Also ne. Asia.

128-N, 128-NE. *Salix discolor* Mühl., pussy willow. Nfld. and Labr. w. across Can. to n. B. C., s. in w. mts. to Idaho, Mont., n. Wyo., and Black Hills of S. Dak., and in e. from N. Dak. s. to Iowa, extreme ne. Mo., and s. Ill., and e. to N. J., and s. in mts. to e. Ky. and e. Tenn.

129-NE, 129-SE, 129-N. *Salix exigua* Nutt., coyote willow. Widespread from e. Que. and N. B., w. across Can. to c. Man., Mack., Yukon, and c. Alaska, s. to B. C., and from c. Wash. to s. Calif., and e. to Trans-Pecos and s. Tex., s. La., w. Tenn., Ky., and Va. Also across n. Mex. (B. Cal. e. to Tamps.)

130. *Salix floridana* Chapm., Florida willow. Rare, s. Ga. to nw. and c. Fla.

131-N, 131-NE. *Salix lucida* Mühl., shining willow. Nfld. and Labr. w. to n. Ont., n. Man., and e. Sask., s. to n. N. Dak., Black Hills of S. Dak., and n. Iowa, and e. to c. Ohio, Pa., and N. J. Also local in W. Va., sw. Va., Md., and Del.

132-N, 132-NE. *Salix pellita* Anderss., satiny willow. Nfld. and Labr., w. to c. Que., n. Ont., c. and n. Man., and e. Sask., s. locally to n. Minn., n. Mich., w. N. Y., Vt., N. H., Maine, and N. S.

133-N, 133-NE. *Salix petiolaris* J. E. Sm., meadow willow. N. B., s. Que., and Maine, w. to s. Ont., c. Man., n. Alta., Mack., and e. B. C., and s. to N. Dak., Black Hills of S. Dak., Nebr., and Colo., and e. to Iowa, Ind., Pa., and N. J. Also local in sw. Va.

134-N, 134-NE. *Salix pyrifolia* Anderss., balsam willow. Nfld. and Labr., w. to s. Que., c. Ont., n. Sask., n. Alta., s. Mack., and Yukon, s. to e. B. C., and e. to s. Man., c. Minn., Wis., Mich., n. N. Y., Maine, and N. S.

135-N, 136-NE. *Salix sericea* Marsh., silky willow. C. N. S., N. B., and Maine, w. to N. Y., s. Ont., n. Mich., Wis., and extreme se. Minn., s. to e. Iowa and n. Ark., and e. to n. Ala., n. Ga., and S. C.

136-NE, 135-SE, 136-N. *Sambucus canadensis* L., American elder. N. S. (Cape Breton Is.), P. E. I., N. B., s. Que., and Maine, w. to s. Ont., n. Mich., n. Minn., and se. Man., s. to e. N. Dak., w. Kans., and nw., c., and s. Tex., and e. to s. Fla.

137. *Serenoa repens* (Bartr.) Small, saw palmetto. Coastal Plain from extreme s. S. C. s. to s. Fla. including Fla. Keys, and w. to s. Miss. and se. La.

138. *Sapindus drummondii* Hook. & Arn., western soapberry. Sw. Mo. w. to Kans. and se. Colo., s. to c. and s. Ariz., Trans-Pecos and s. Tex., and La. Also n. Mex. (Son., Chih., Coah., and Tamps.).

139. *Sapindus saponaria* L., wingleaf soapberry. Local in se. Ga. and scattered from n. to s. Fla. including Fla. Keys. Northward range extended perhaps by Indians and Europeans. Widely distributed in tropical America and spread by cultivation. Also from Mex. s. to Brazil and Argentina. Through West Indies including Bahamas, P. R., and V. I. Also Hawaii and other Pacific Is. Introduced into Old World tropics.

140-N, 140-SE. *Solanum erianthum* D. Don, mullein nightshade. Extreme s. Tex., Fla. Keys, perhaps native, s. and c. Fla., mostly near coasts, probably naturalized northward. Through West Indies including Bahamas, P. R., and V. I. Also from n. Mex. (Son. to Tamps. s. to Chis.) s. through C. Am. and n. S. Am. to Peru. Also Old World tropics.

141-N, 141-NE. *Sorbus americana* Marsh., American mountain-ash. Nfld. and e. Que. w. to w. Ont., s. to ne. Minn., Wis., and n. Ill., and e. to N. Y., Pa., N. J., and s. in mts. from W. Va. and w. Va. to w. N. C., n. S. C., n. Ga., and e. Tenn.

142-N, 142-NE. *Sorbus decora* (Sarg.) Schneid., showy mountain-ash. S. Greenland, Nfld., and Labr., w. to n. Que. and w. Ont., s. to n. Minn., Wis., and ne. Iowa, e. to n. Ind., ne. Ohio, N. Y., Conn., and Mass.

143-NE, 143-SE. *Staphylea trifolia* L., American bladdernut. N. H., Vt., and extreme s. Que., w. to s. Ont., Mich., n. Wis., and se. Minn., s. to e. Nebr., and e. Okla., and e. to Ark., nw. Fla., and Ga.

144. *Shepherdia argentea* (Pursh) Nutt., silver buffaloberry. S. Man. w. to s. Alta., s. mostly in mts. to se. Oreg., Nev., and e. and s. Calif., e. to extreme n. Ariz. and n. N. Mex., and n. to Nebr., nw. Iowa, and w. Minn.

145. *Sophora affinis* Torr & Gray, Texas sophora. Nw. La. and sw. Ark., w. to s. Okla., and c. Tex.

146. *Stewartia malacodendron* L., Virginia stewartia. Coastal Plain, chiefly, from e. Va. and N. C., sw. to nw. Fla., La., se. Tex., and s. Ark.

147. *Stewartia ovata* (Cav.) Weatherby, mountain stewartia. Mts., chiefly, from e. and s. Va. to se. Ky., s. to e. Tenn., extreme ne. Miss., c. Ala., n. Ga. and c. N. C.

148. *Styrax americana* Lam., American snowbell. Coastal Plain, chiefly, from se. Va. to c. Fla., and w. to e. Tex., n. in Miss. Valley to extreme se. Okla., se. Mo., S. Ill., sw. Ind., and w. Ky.

149. *Styrax grandifolia* Ait., bigleaf snowbell. Coastal Plain, chiefly, from se. Va. to c. Fla., and w. to e. Tex., n. in Miss. Valley to extreme se. Okla., se. Mo., s. Ill., sw. Ind., and w. Ky.

150. *Styrax platanifolia* Engelm., sycamore-leaf snowbell. Local in Edwards Plateau of c. Tex.

151. *Symplocos tinctoria* (L.) L'Hér., common sweetleaf. Coastal Plain, chiefly, from s. Del., se. Md., and se. Va. to n. and c. Fla., and w. to e. Tex., n. in Miss. Valley to extreme se. Okla. and c. Ark.

152-NE, 152-SE. *Toxicodendron vernix* (L.) Kuntze, poison-sumac. S. Maine w. to extreme s. Que., N. Y., s. Ont., c. Mich., c. Wis., and se. Minn., s. to Ill., se. Tenn., e. Tex., and c. Fla.

153. *Tilia caroliniana* Mill., Carolina basswood. Coastal Plain and Piedmont from N. C. to c. Fla., w. to e. and c. Tex., and n. to se. Okla. and c. Ark.

154. *Vaccinium arboreum* Marsh., tree sparkleberry. Va. w. to Ky., s. Ind., s. Ill., and extreme se. Kans., s. to e. Okla. and se. Tex., and e. to c. Fla.

155. *Viburnum lentago* L., nannyberry. N. B., Maine, and s. Que., w. to s. Ont., n. Mich., s. Man., and se. Sask., s. to N. Dak., Black

Hills of S. Dak., extreme ne. Wyo., and e. to nw. and e. Nebr., Iowa, n. Mo., Ohio, W. Va., and N. J., also local in sw. Va. and w. Ky.

156. *Viburnum nudum* L., possumhaw viburnum. Coastal Plain, chiefly, from s. Conn., Long Is., N. J., and sw. Pa., to c. Fla., w. to e. Tex., and n. to c. Ark. and w. Tenn.

157. *Viburnum obovatum* Walt., Walter viburnum. Coastal Plain from e. S. C. to c. and nw. Fla.

158. *Viburnum prunifolium* L., blackhaw. Sw. Conn. and se. N. Y., w. to s. Mich., extreme se. Wis., Ill., and sw. Iowa, s. to e. Kans. and c. Ark., and e. to Tenn., Ala., and S. C.

159-N, 159-NE. *Viburnum trilobum* Marsh., American cranberry-bush. Nfld., N. S. (Cape Breton Is.), P. E. I., N. B., and s. Que., w. to s. Ont., and s. Man., s. to N. Dak., Black Hills and ne. S. Dak., and e. to ne. Iowa, n. Ill., Pa., and N. J., and local in W. Va. and n. Va. Also local in s. Alta., s. B. C., and Wash.

160. *Viburnum rufidulum* Raf., rusty blackhaw. Se. Va. w. to Ky., s. Ohio, s. Ind., c. Mo., and e. Kans., s. to c. Okla. and c. and e. Tex., and e. to n. Fla.

161. *Yucca aloifolia* L., aloe yucca. Coastal dunes and mounds from se. N. C. to s. Fla. including Fla. Keys and w. to s. Ala.

162. *Yucca gloriosa* L., moundlily yucca. Coastal dunes and beaches from ne. N. C. to se. Ga. and extreme ne. Fla.

163. *Zanthoxylum americanum* Mill., common prickly-ash. s. N. H., Vt., and sw. Que., w. to s. Ont., n. Mich., n. Minn., and e. N. Dak., s. to c. Nebr. and c. Okla., e. to S. C., and n. to sw. Va., Pa., and N. J.

164-N, 164-SE. *Zanthoxylum fagara* (L.) Sarg., lime prickly-ash. C. and s. Fla. including Fla. Keys, and se., s., and sw. Tex. Also West Indies from Bahamas to Cuba and Hispaniola and n. Mex. (Tamps. to Coah., s. Son., and s. B. Cal. Sur, southward) s. to C. Am. and S. Am.

165. *Zanthoxylum clava-herculis* L., Hercules-club. Coastal Plain from e. Va. to s. Fla. and w. to e. Tex., and n. to se. Okla. and c. Ark.

166. *Zanthoxylum hirsutum* Buckl., Texas Hercules-club. S. Okla. s. to s. and sw. Tex. and ne. Mex. (n. Tamps. and n. N. L.).

NOTES ON RANGES

Some observations on tree distribution may be noted from the maps of the 166 species in this volume. However, analyses of the ranges are outside the scope of the Atlas. An attempt has been made to record where each species grows naturally now, not to explain or speculate how and why.

Many maps show distinctive or unusual ranges. Especially noteworthy are the species of farthest geographic extent and greatest variation in environmental conditions. Some species may be widely adapted to many types of climates. Others apparently are composed of geographic races.

Relatively few species have broad east-west distribution nearly across the continent and can be classed as transcontinental. The widespread conifers and important hardwoods were mapped in Volume 1. Twenty species of this volume extend westward beyond the maps of the 37 Eastern States. Western ranges of the same species have been shown in Volume 3. These minor hardwood species of broad east-west distribution are listed below. Four that range northwest to Alaska are designated by an asterisk (*).

**Amelanchier alnifolia*, western serviceberry

Bumelia lanuginosa, gum bumelia

Cephalanthus occidentalis, common buttonbush

Cercis canadensis, eastern redbud

**Cornus stolonifera*, red-osier dogwood

Corylus cornuta, beaked hazel

Crataegus succulenta, fleshy hawthorn

Prunus americana, American plum

Prunus angustifolia, Chickasaw plum

Prunus pensylvanica, pin cherry

Prunus virginiana, common chokecherry

Ptelea trifoliata, common hoptree

Rhus glabra, smooth sumac

**Salix bebbiana*, Bebb willow

Salix discolor, pussy willow

**Salix exigua*, coyote willow

Salix petiolaris, meadow willow

Sapindus drummondii, western soapberry

Viburnum lentago, nannyberry

Viburnum trilobum, American cranberrybush

One shrubby species, *Cornus stolonifera*, red-osier dogwood, reaches from central Alaska across Canada to Newfoundland and south to the Northeastern States and in western mountains to northern Mexico. Another, smooth sumac, *Rhus glabra*, is the only species classed as sometimes reaching tree size and native in all 48 contiguous States and also in adjacent Canada and Mexico. However, it has been found in California only once and in Nevada at only two localities.

Nearly all tree species of this volume are confined to North America, but a few tree species, mostly northern or subtropical, extend beyond. *Cephalanthus occidentalis*, common buttonbush, ranges from southeastern Canada and south through Mexico into Central America and in Cuba. The same or a closely related species is recorded from eastern Asia.

Species found near sea level in the North rise to higher altitudes southward. These northern trees reach their southern limits in the Southern Appalachians, where they are classed as mountain species. Overlay 3, Topographic Relief, in Volume 1, has contour lines, which may indicate some relationships in distribution. Endemic, disjunct, and northern trees in the Southern Appalachians have been discussed elsewhere (Little 1971b).

Other species are southern and characteristic of the Gulf and Atlantic Coastal Plains. Many of these extend northward along the Atlantic coast, some to New England or beyond. Inland, some project up the Mississippi Valley.

Eleven common tree species of Eastern United States cited in Volume 1 reappear southward on mountains of Mexico or also Central America, sometimes as distinct botanical varieties or under separate names. Several species of the southeastern Coastal Plain mapped in this volume are present also in the Coastal Plain or mountains of Mexico or Central America or beyond. Illustrations are:

Cyrilla racemiflora, swamp cyrilla

Hamamelis virginiana, witch-hazel

Ilex cassine, dahoon

Ilex decidua, possumhaw

Ilex vomitoria, yaupon

Illicium floridanum, Florida anise-tree

Myrica cerifera, southern bayberry

Osmanthus americanus, devilwood

Rhamnus caroliniana, Carolina buckthorn

A few tree species of the southeastern Coastal Plain reappear in Cuba or beyond in the West Indies, sometimes as a named variety. (Nearly all the tropical tree species of South Florida, to be mapped in Atlas Volume 5, are also widely distributed in the West Indies.)

Examples from this volume are:

- Baccharis halimifolia*, eastern baccharis (var. in Cuba)
- Cephanthus occidentalis*, common buttonbush
- Cyrilla racemiflora*, swamp cyrilla (to Puerto Rico and northern South America)
- Fraxinus caroliniana*, Carolina ash (var. in Cuba)
- Ilex cassine*, dahoon (to Puerto Rico)
- Myrica cerifera*, southern bayberry (to Puerto Rico)
- Salix caroliniana*, Coastal Plain willow

RARE AND LOCAL EASTERN HARDWOODS

The maps of this Atlas show clearly which tree species are confined to limited geographic areas. From these trees of local occurrence, lists of rare and endangered species may be compiled. The subject of rare and endangered trees is being treated in a series of separate publications.

The first report, "Rare and Local Conifers in the United States" (Little 1975) is based upon Volume 1 and contains maps of 35 species from that source. Similarly, the species maps of Volumes 3 and 4 reveal much information about rare and endangered hardwoods. A summary of the species in eastern continental United States (exclusive of southern Florida and southern Texas) may be appropriate here. Rare tropical trees of south Florida will be treated in Volume 5 and in a separate report (Little 1976b).

The Endangered Species Act of 1973 (U.S. Public Law 93-205, approved December 28, 1973) directed the Smithsonian Institution to prepare a list of endangered and threatened plant species, to review methods of adequately conserving these species, and to report the Institution's recommendations to the Congress. Accordingly, the Secretary presented to the Congress on December 15, 1974, its 200-page "Report on Endangered and Threatened Plant Species of the United States" (Smithsonian Institution 1975). As explained in the foreword by Secretary S. Dillon Ripley, this preliminary report provides lists of proposed endangered, threatened, recently extinct, and exploited species of native plants of the United States.

However, the Act also provides that the Secretary of the U.S. Department of the Interior must study the Smithsonian Institution's preliminary lists of species and determine whether or not any species is truly threatened or endangered. At this time, no species has officially been so classified by the Secretary. The Fish and Wildlife Service (1975) published the list as a notice of consideration for review of status and invitation for proposals. Thus, the threatened and endangered species mentioned below are tentative or preliminary and will remain so until the Secretary makes a final determination—possibly several years in the future.

The preliminary lists for continental United States comprise about 10 percent of the flora, or 2,099 species (including some varieties and subspecies). Fortunately, the number of tree species and varieties is small, only about 32 (also 11 varieties), of which 13 are eastern hardwoods mapped in Volume 4. The number of species of rare trees is somewhat larger.

Next, a few definitions. A *rare* species has small numbers of individuals throughout its range, which may be restricted or widespread. The term *local* species (also *endemic*) is used here for a species of relatively small range, such as a small part of a State or a few islands. *Border* or *peripheral* species reach the limit of their natural range a short distance into the United States, for example, from Mexico into the Southwest or from the West Indies to Florida.

An *extinct* species (recently or possibly extinct) is no longer known to exist after repeated search of the type locality and other known or likely places.

As defined in the Act, "the term *endangered species* means any species which is in danger of extinction throughout all or a significant portion of its range . . ." "The term *threatened species* means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."

Only about 23 species of minor eastern hardwoods of the 166 mapped in Volume 4 have relatively small ranges in the United States and may be classed under one or more of the above terms. Several rare varieties are not mapped separately or mentioned. South Florida has a large number of rare trees, border or peripheral species, which are also found in the West Indies or in Mexico, and thus they are not endangered at present.

The list of recently extinct species of higher plants in continental United States (Smithsonian Institution, 1975, p. 38-47) contains about 100 kinds. However, the two trees listed, both mapped in this volume, still exist.

Franklinia alatamaha, franklinia, is the symbol of the endangered plant program and appeared on a botanical commemorative postage stamp in 1969. This large shrub or small tree named for Benjamin Franklin was discovered in 1765 by John and William Bartram but has not been seen wild since 1790. The original colony near Fort Barrington on the Altamaha River, McIntosh County, southeastern Georgia, probably was exterminated by transplanting the cultivation and thus saved. This species is classed as extinct in the wild but is also in cultivation for its large white flowers.

Betula uber, Ashe birch, was classed as probably extinct until rediscovered in 1975. It was named in 1918 from Smyth County, southwestern Virginia. Rediscovery was reported by Ogle and Mazzeo (1975, 1976) and Reed (1975). The last concluded that the few trees found on private land had been planted and that they probably represented the hybrid between yellow birch, *B. alleghaniensis* Britton, and low birch *B. pumila* L. var. *glandulifera* Reg., and known also as Purpus birch, *B. xpurpusii* C. K. Schneid. If shown to be an artificial hybrid, this birch should be removed from lists of both native and rare trees.

The 23 species of hardwoods with local distribution in eastern continental United States (exclusive of southern Florida and southern Texas) are mapped in Volume 4. These mostly southern species (also several local varieties not listed or mapped separately) may be grouped geographically in the four lists below. Of the 13 on the lists compiled by the Smithsonian Institution, 1 is designated as extinct except in cultivation, 3 are designated endangered, and 9 are classed as threatened.

Southern Appalachians (or slightly beyond)

- Betula uber*, Ashe birch (formerly classed as extinct)
- Castanea ozarkensis*, Ozark chinkapin (Ozark Mountains) (endangered)
- Cladrastis kentukea*, yellowwood
- Cotinus obovatus*, American smoketree (to Ozarks and Texas)
- Prunus alleghaniensis*, Allegheny plum (threatened)
- Quercus georgiana*, Georgia oak (Piedmont) (threatened)
- Quercus oglethorpensis*, Oglethorpe oak (Piedmont) (threatened)
- Robinia kelseyi*, Kelsey locust

Southeastern Coastal Plain

Acer leucoderme, chalk maple
Aesculus parviflora, bottlebrush buckeye
Alnus maritima, seaside alder (Delaware, Maryland, Oklahoma)
(threatened)
Elliottia racemosa, elliottia (endangered)
Franklinia alatamaha, franklinia (extinct except in cultivation)
Ilex amelanchier, sarvis holly (threatened)
Leitneria floridana, corkwood (threatened)
Pickneya pubens, pinckneya (threatened)
Yucca gloriosa, moundlily yucca

Florida

Carya floridana, scrub hickory
Magnolia ashei, Ashe magnolia (threatened)
Illicium parviflorum, yellow anise-tree (threatened)
Salix floridana, Florida willow (endangered)

Texas

Celtis lindheimeri, Lindheimer hackberry (also Mexico)
Fraxinus texensis, Texas ash (also Oklahoma)

APPLICATIONS OF THE MAPS

Several applications of these maps of minor eastern hardwoods may be repeated from previous volumes, though most uses are obvious. First, the maps show where each tree species grows wild and can be found for study for any purposes. Also, where plantations or trees from locally collected seed should be successful.

To specialists, the maps may reveal errors and suggest corrections, and also likely localities where further field work is needed for revision and where range extensions and State records may be sought. The natural ranges are preserved for the historical record, before the forests are destroyed or partly replaced by plantations of improved varieties and hybrids. The maps have economic value, suggesting possible sources of wood and other products in addition to the detailed information on timber volumes provided by forest surveys.

The transparent overlays (Volume 1) and maps together summarize graphically the average and extreme conditions of the environment (temperature, precipitation, latitude, altitude, etc.) of each species. They provide the basis for correlation studies of distribution of a species and the environment, including limiting factors. Also, these maps may indicate local climates to which geographical or local races may be adapted.

The maps are of special importance in the collection of seed. They show first the geographic areas and localities where seed can be collected from wild trees. They suggest the possible occurrence of geographic races and seed sources, particularly for tree improvement programs, including hybridization tests and for testing or introduction beyond the native range, such as in foreign countries with similar climates.

Maps can be helpful in identifying wild trees by indicating the presence or absence of a species in a particular area. For tree identification, a new handbook with revised small maps is planned.

Finally, the maps serve as background material for such studies as classification, evolution, paleobotany, and genetics, and for the

distribution of associated animals and plants, especially insects and parasitic fungi.

FUTURE WORK

A revised Atlas with highly accurate maps of the native tree species of continental United States could be compiled at an early date after additional field work in many places. Future human activities may affect tree distribution and obscure the natural ranges. Some forests are being removed by cultivation and other land uses, while others will be replaced by plantations of improved tree varieties and hybrids. A few species may become extinct at outlying stations or be restricted by insect pests or diseases. Others may migrate and shift their ranges in response to climatic cycles and other factors. Thus, these maps showing natural ranges at present may have additional historical significance in the future.

There is still a need for more articles, bulletins, and books devoted to distribution maps of native tree species prepared by experienced resident botanists or foresters in those States not already covered by published references.

Botanists and foresters are urged to publish promptly articles containing records on range extensions of trees from their collections, herbaria, or observations. Duplicate specimens confirming these records should be deposited in one or more large herbaria, as well as in the State or institution herbarium. Care should be taken in all distribution records, including maps and herbarium labels, to distinguish between wild trees apparently native and trees introduced into the locality directly or indirectly by persons, whether planted, escaped, adventive, or naturalized.

SUMMARY

"Minor Eastern Hardwoods" is the fourth volume of an Atlas showing the natural distribution or range of the native tree species of continental United States. This volume contains large maps of 166 tree species native in eastern contiguous United States not in preceding volumes. The area covered is the 37 Eastern States from Maine west to North Dakota, south to Texas (except Trans-Pecos Texas), and east to Florida (excluding tropical trees of the southern part). However, 89 species of important eastern hardwoods are in Volume 1, and about 30 species of western hardwoods that extend eastward into 1 or more of the 6 intermediate or Midwestern States from North Dakota to Texas are in Volume 3. The genus of hawthorns (*Crataegus*) has been left out because of taxonomic difficulties.

The maps have been compiled from various sources, following the procedure reviewed in the first volume. These include publications, herbarium specimens, field work, and review by botanists, foresters, and others. Credit is due many persons for their valuable assistance. Maps of vegetation, forest types, and landforms have been very helpful in determining lines along borders of ranges.

The species maps follow the general plan of Volumes 1 and 3. The scale of the base map of the United States is the same—1:10,000,000. The second base map, North America, is added for 42 tree species whose natural range extends beyond the rectangle into Canada or Mexico. Natural geographic distribution of each species is shown as a brown-shaded pattern of fine dots on the black and white base map. Outlying stations are plotted by large or small dots.

Order of maps is alphabetical by scientific name. Common and scientific names follow the Forest Service Check List (1953), except for several minor changes in nomenclature.

Notes on ranges are included. About 20 species have broad east-west distribution, and 4 of these range northwest to Alaska. Northern species found near sea level in the North rise to higher altitudes southward and reach their southern limits in the Southern Appalachians. Southern species of the Gulf and Atlantic Coastal Plains extend northward along the Atlantic coast or inland up the

Mississippi Valley.

Rare, local, and endangered species are listed. As mapped, 23 species of minor eastern hardwoods have relatively small range in the United States. One of these is classed as extinct except in cultivation, 3 are classed as endangered, and 9 are designated threatened.

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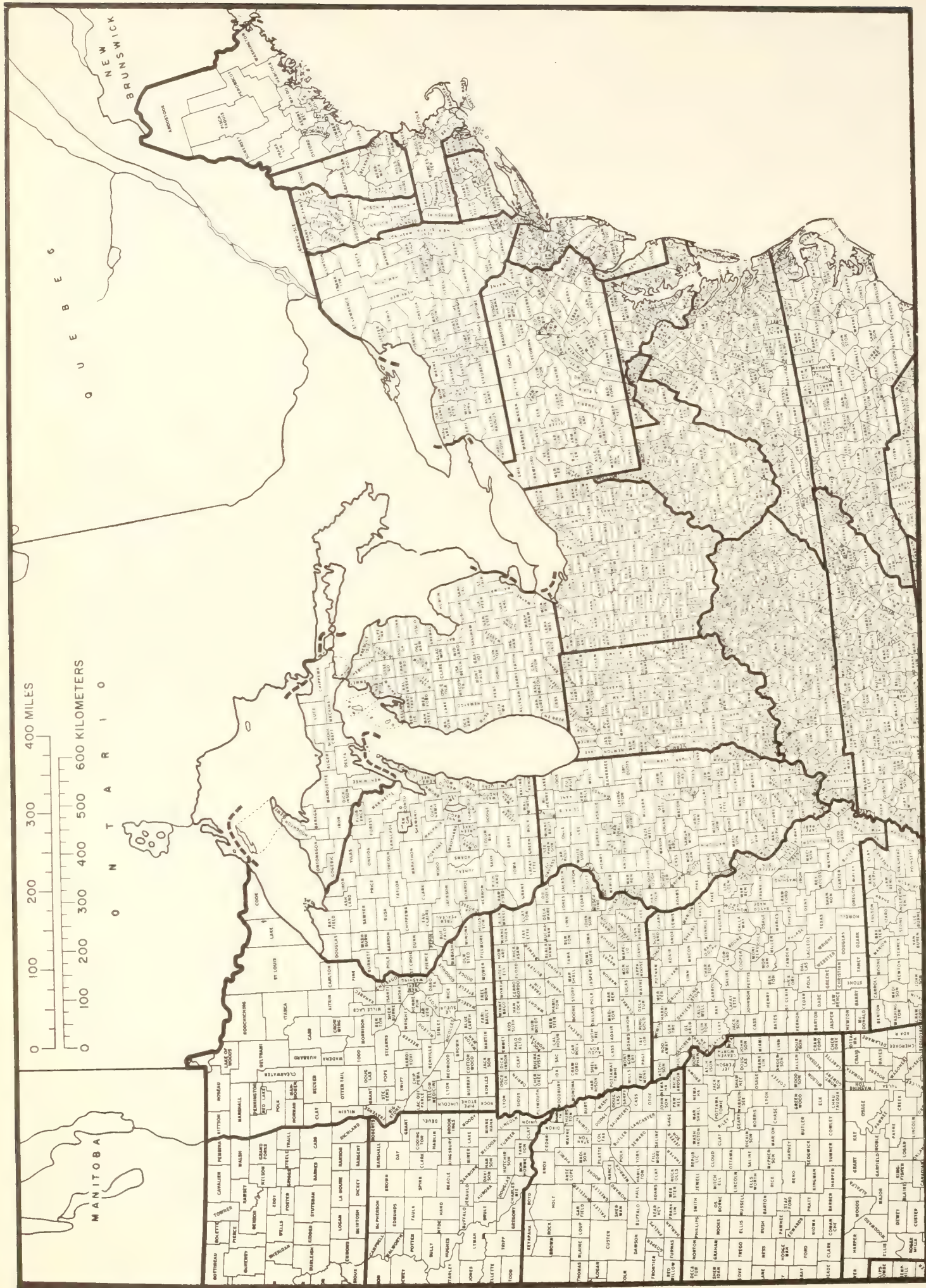
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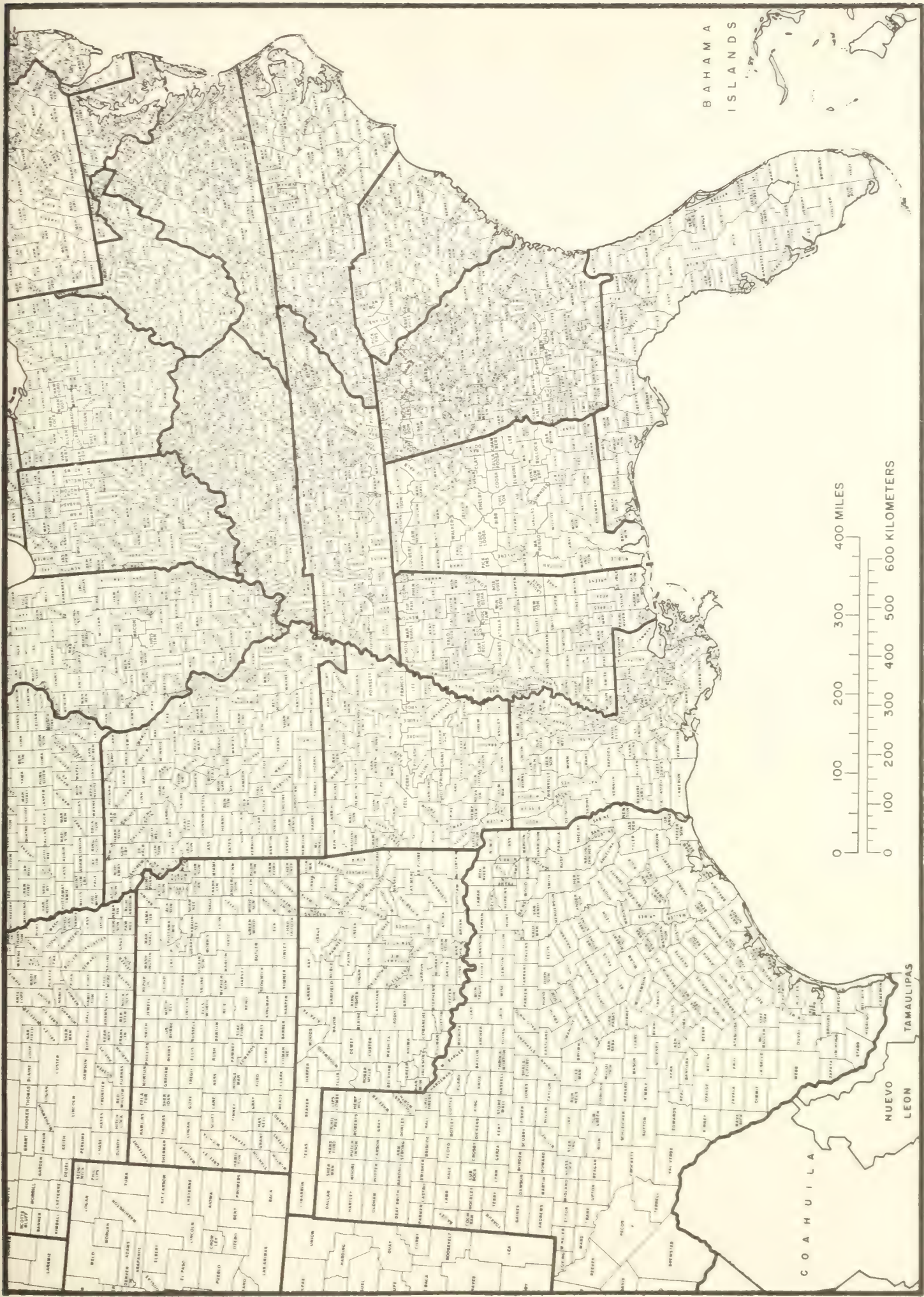
MAPS

Base Maps 1-3

Species Maps 1-166



Map I-NE. Northeastern United States (contiguous). Base map with names of counties.



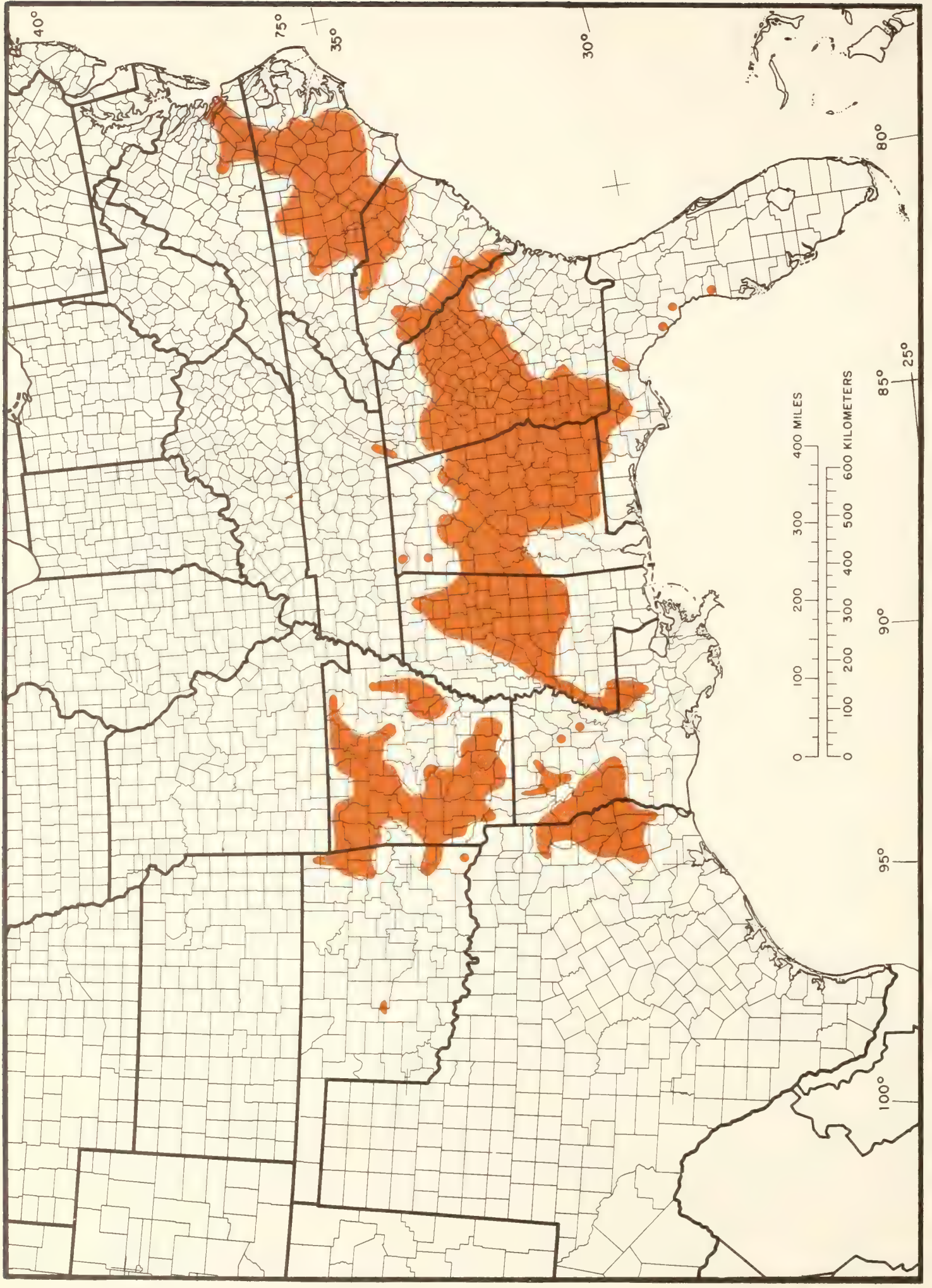
Map 131. Southeastern United States (contiguous). Base map with names of counties.



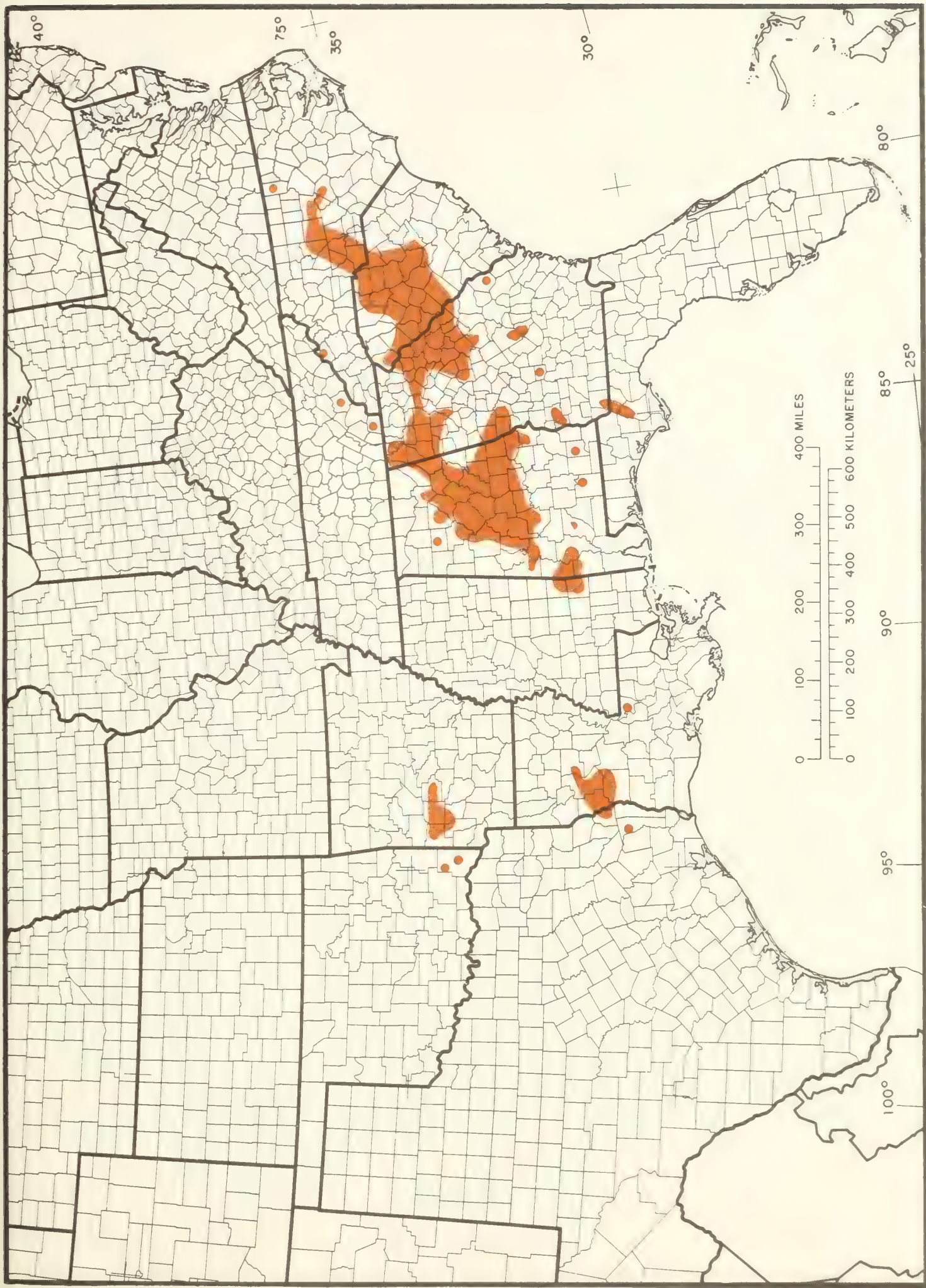




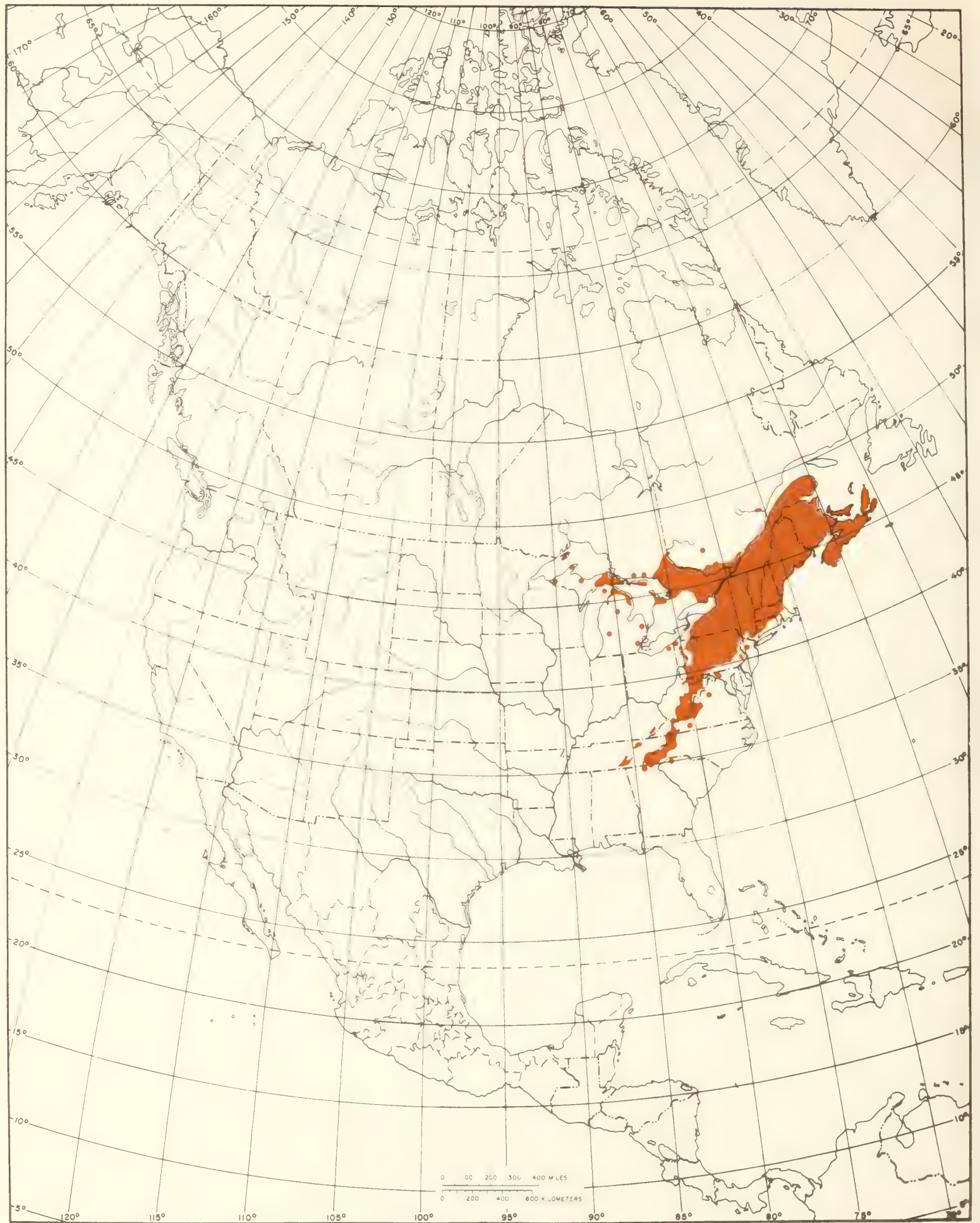
Map 3. United States (contiguous), National Forest System, with names of National Forests and National Grasslands.



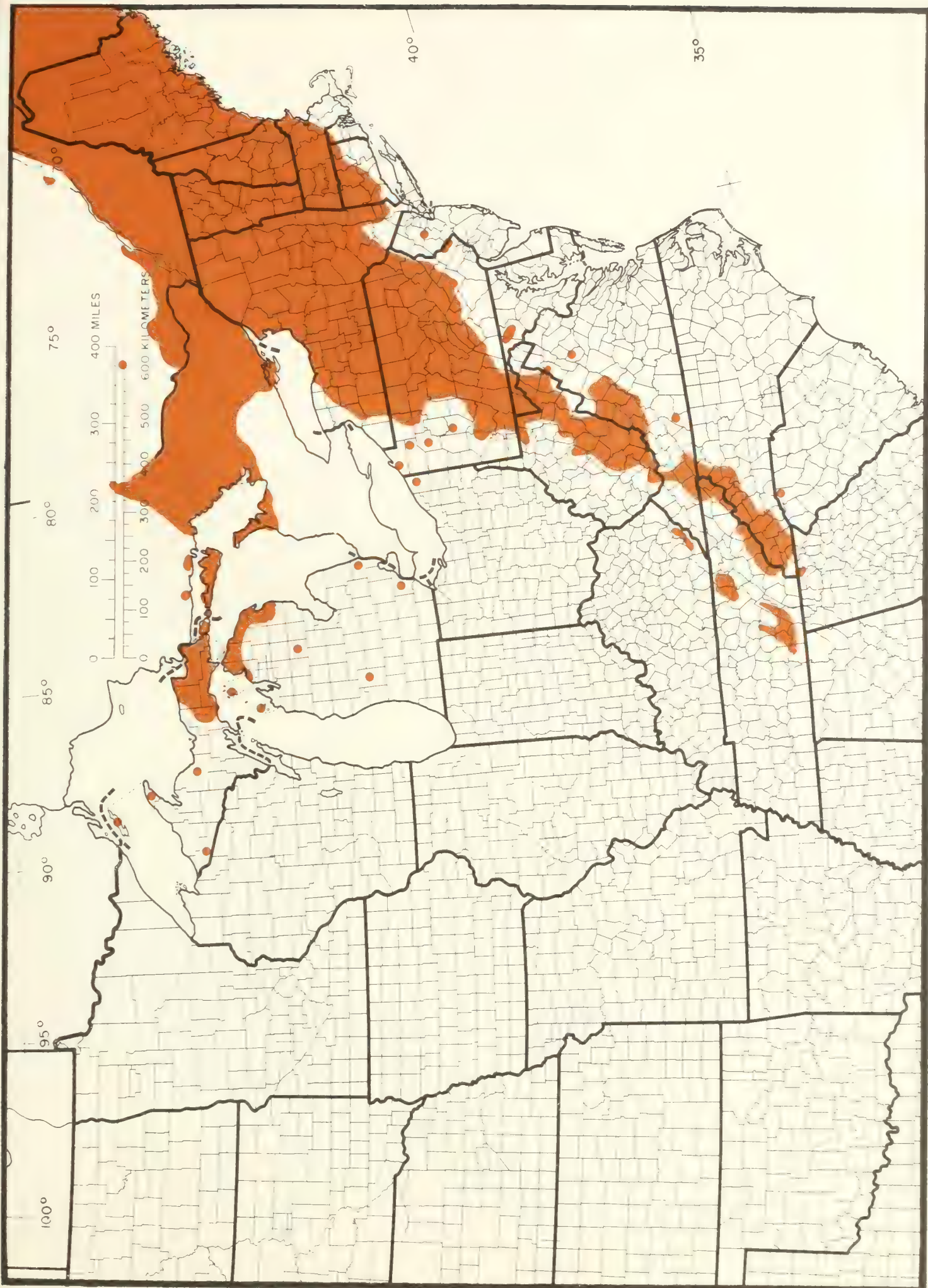
Map 1. *Acer barbatum* Michx., Florida maple.



Map 2. *Acer leucoderme* Small, chalk maple.



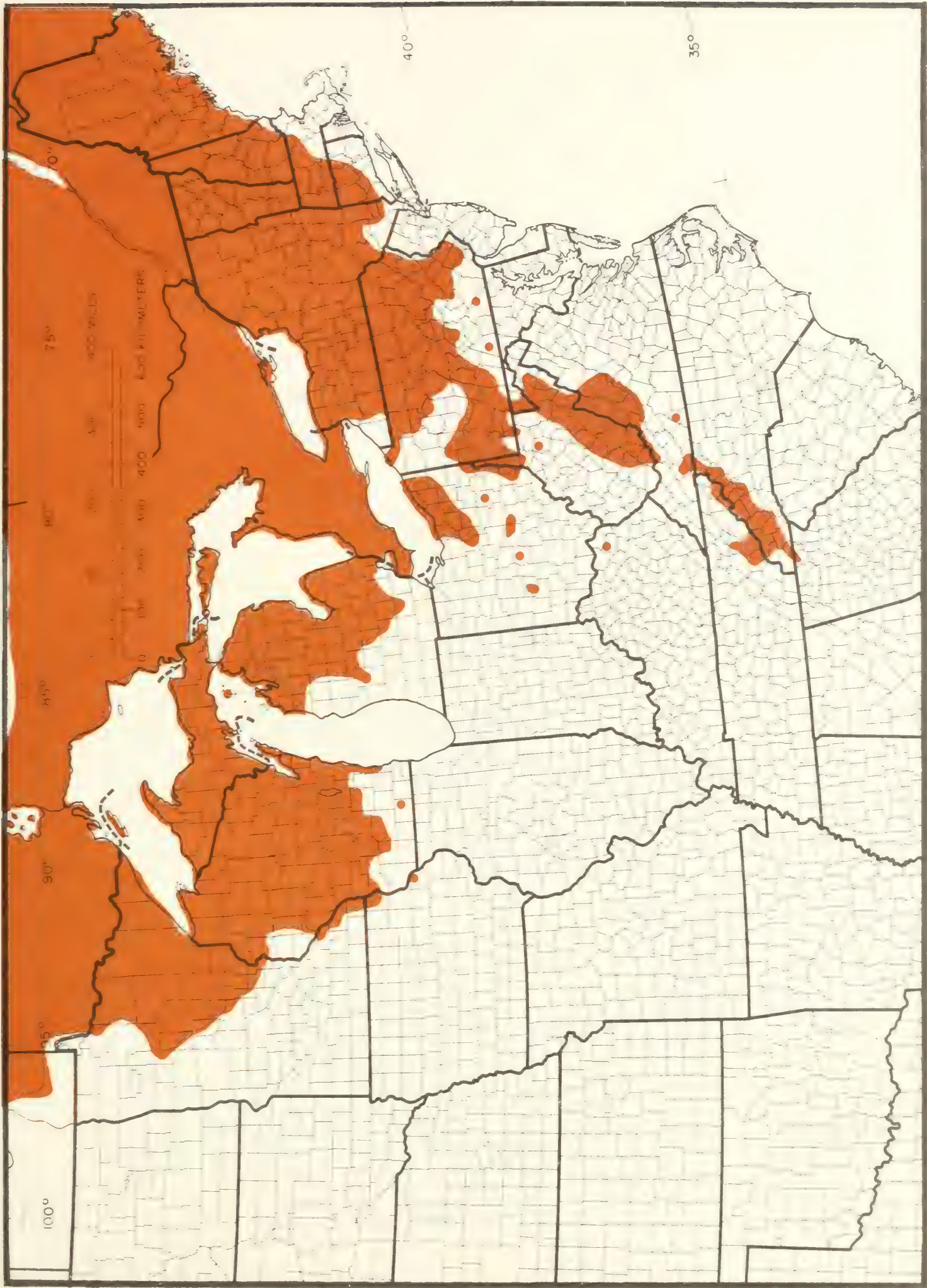
Map 3-N. *Acer pensylvanicum* L., striped maple.



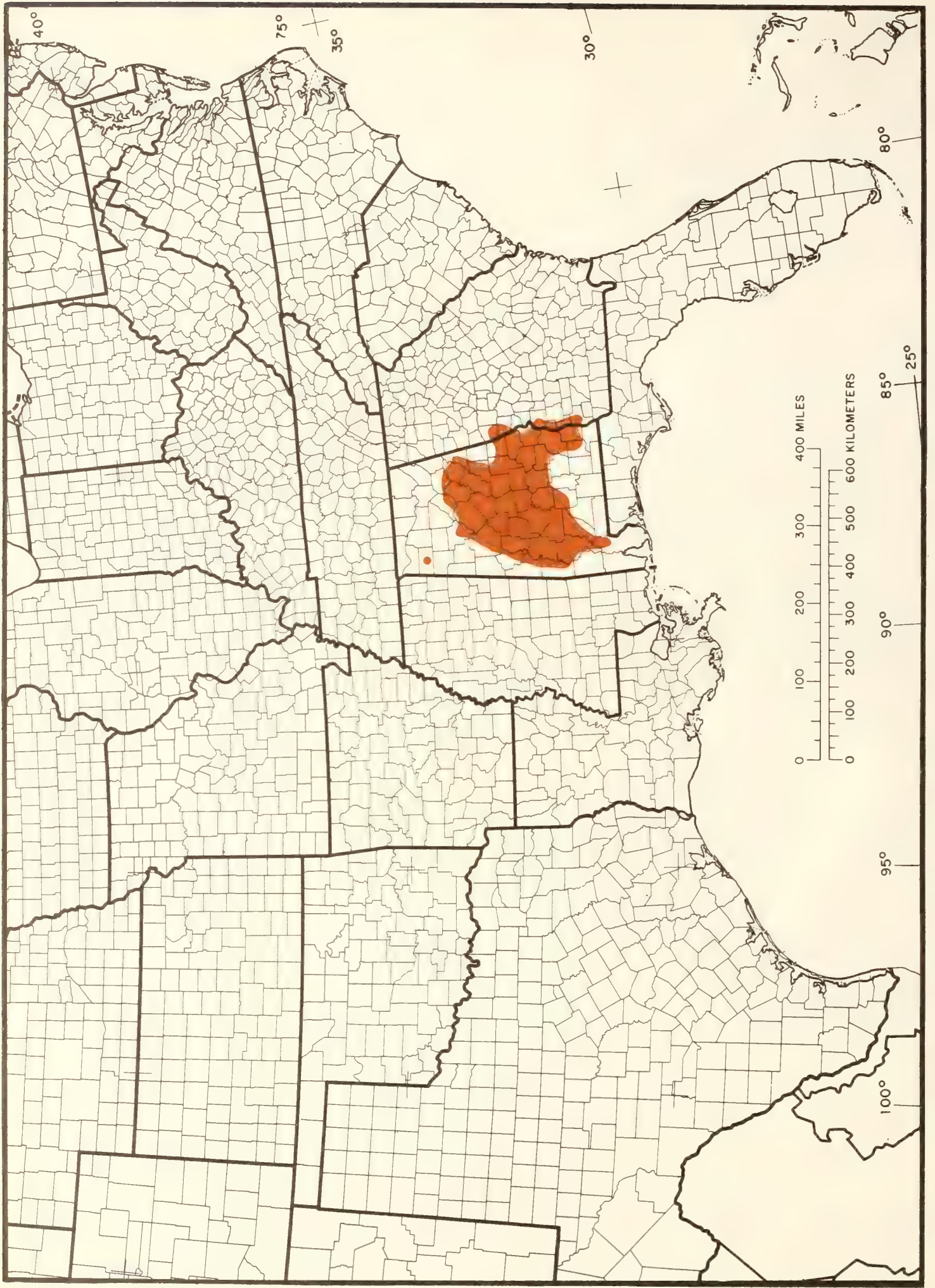
Map 3 N.E. *Acer pensylvanicum* L., striped maple.



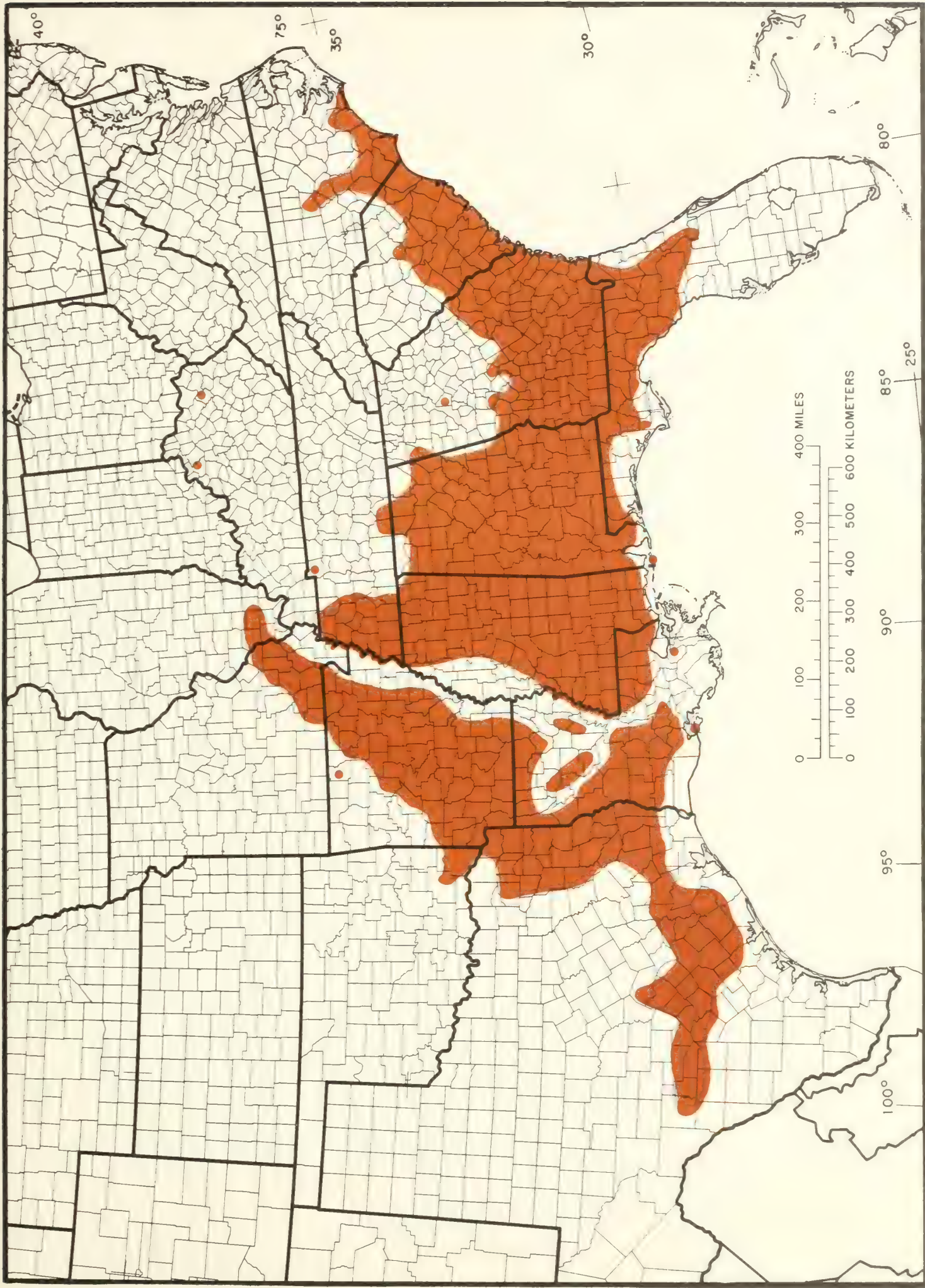
Map 4-N. *Acer spicatum* Lam., mountain maple.



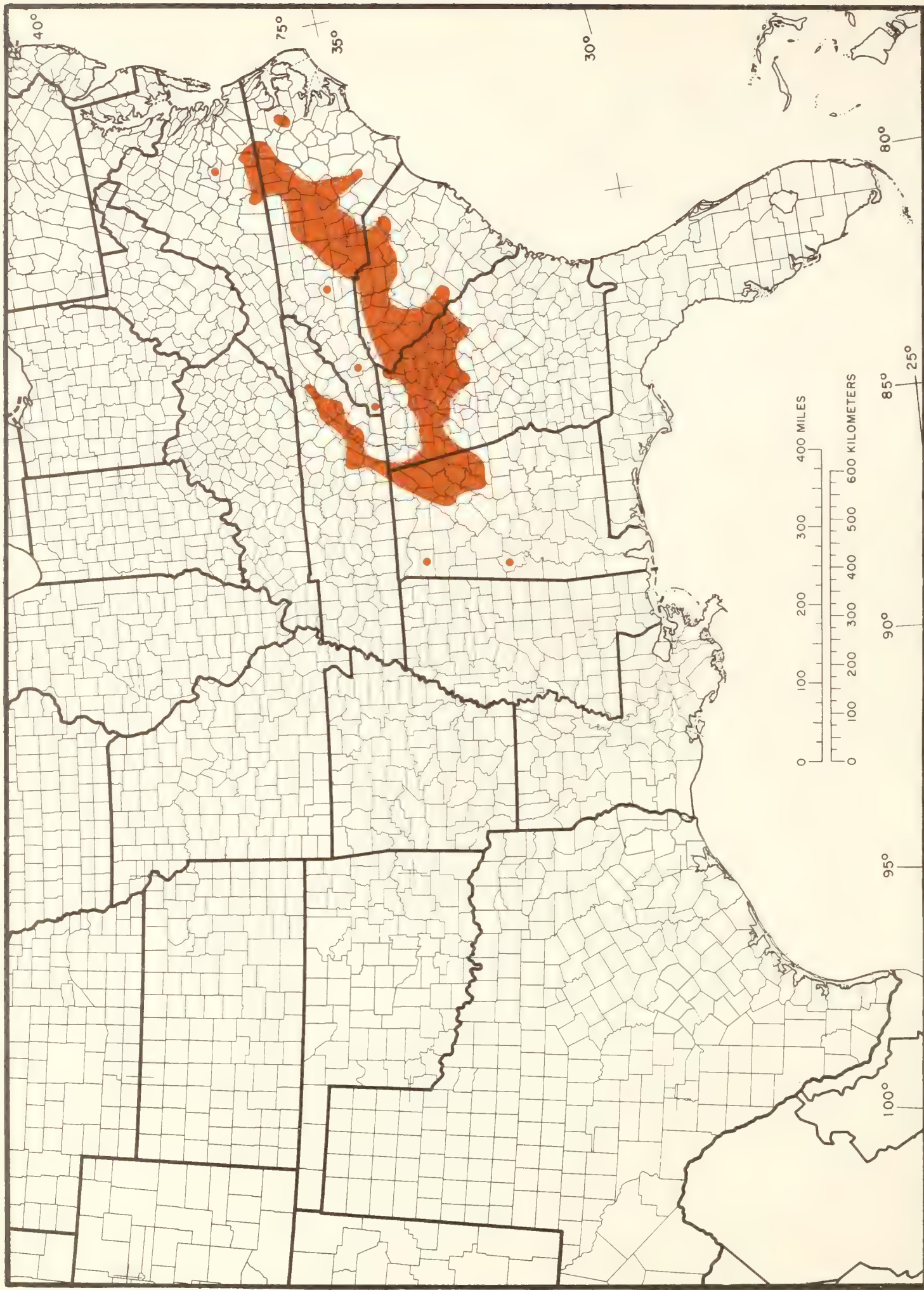
Map I-NE. *Acer spicatum* Lam., mountain maple.



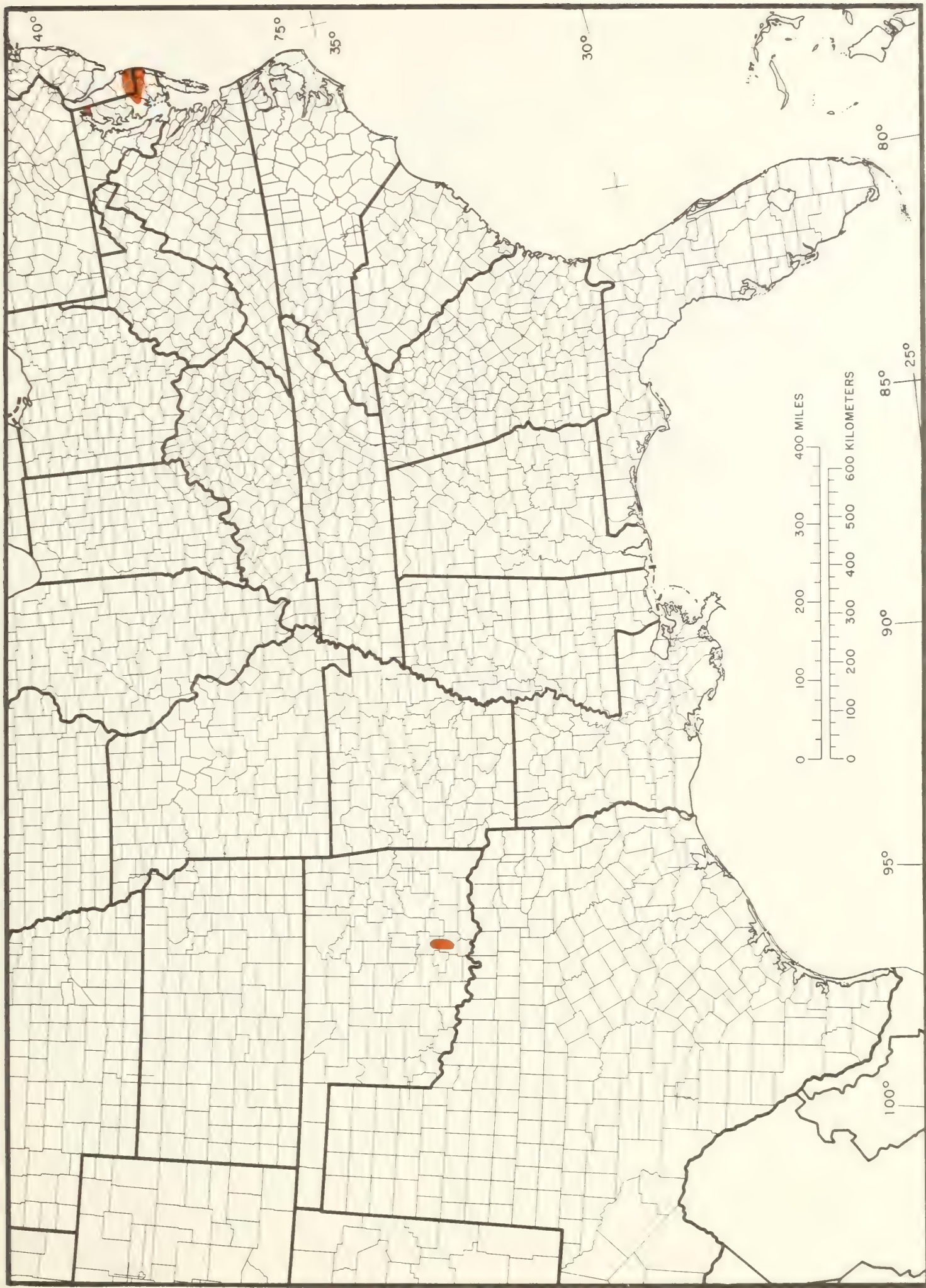
Map 5. *Aesculus parviflora* Walt., bottlebrush buckeye. Local in Ala. and sw. Ga.



Map 6. *Jesculus parva* L., red buckeye.



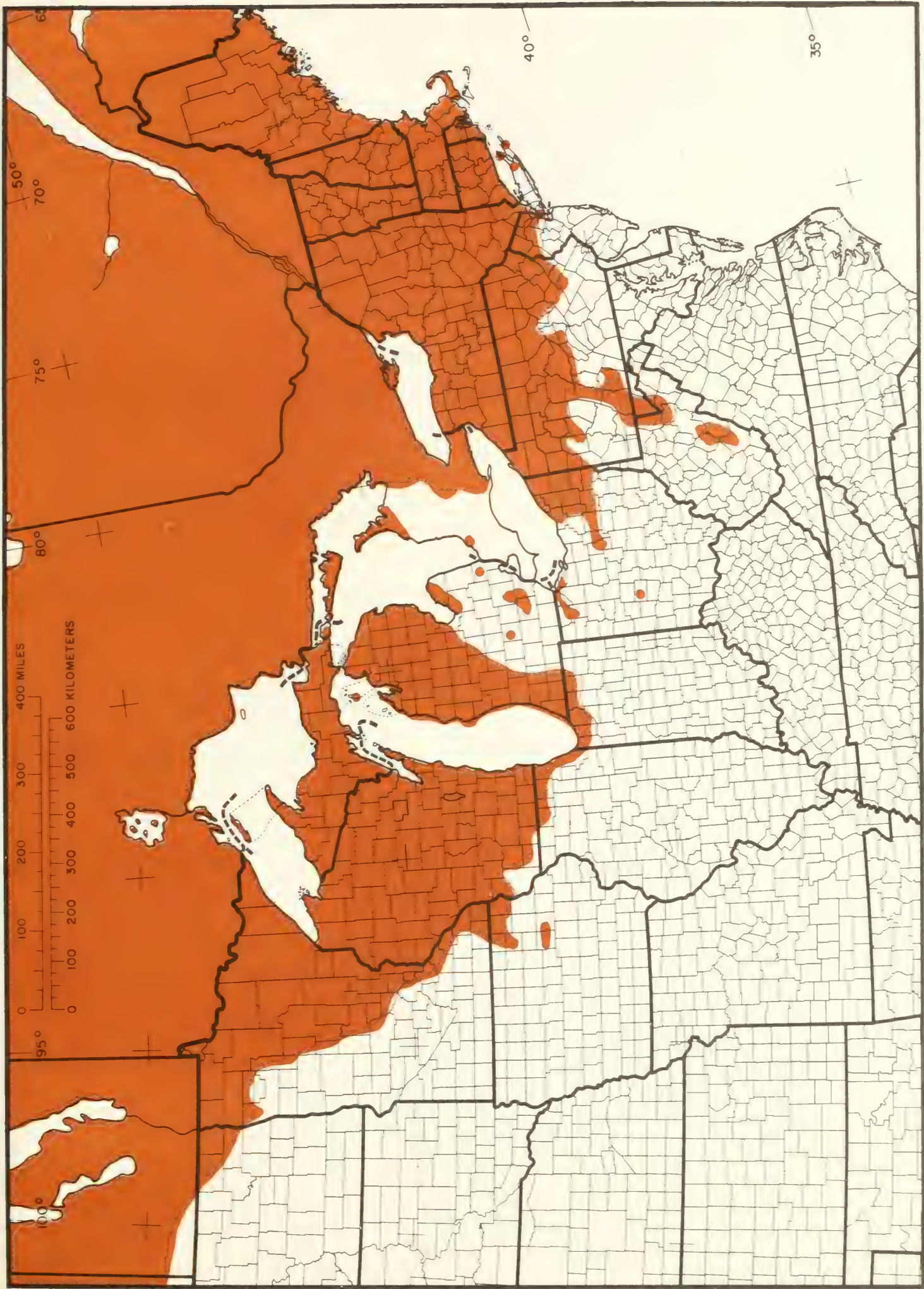
Map 7. *Jesculus sylvatica* Bart., painted buckeye.



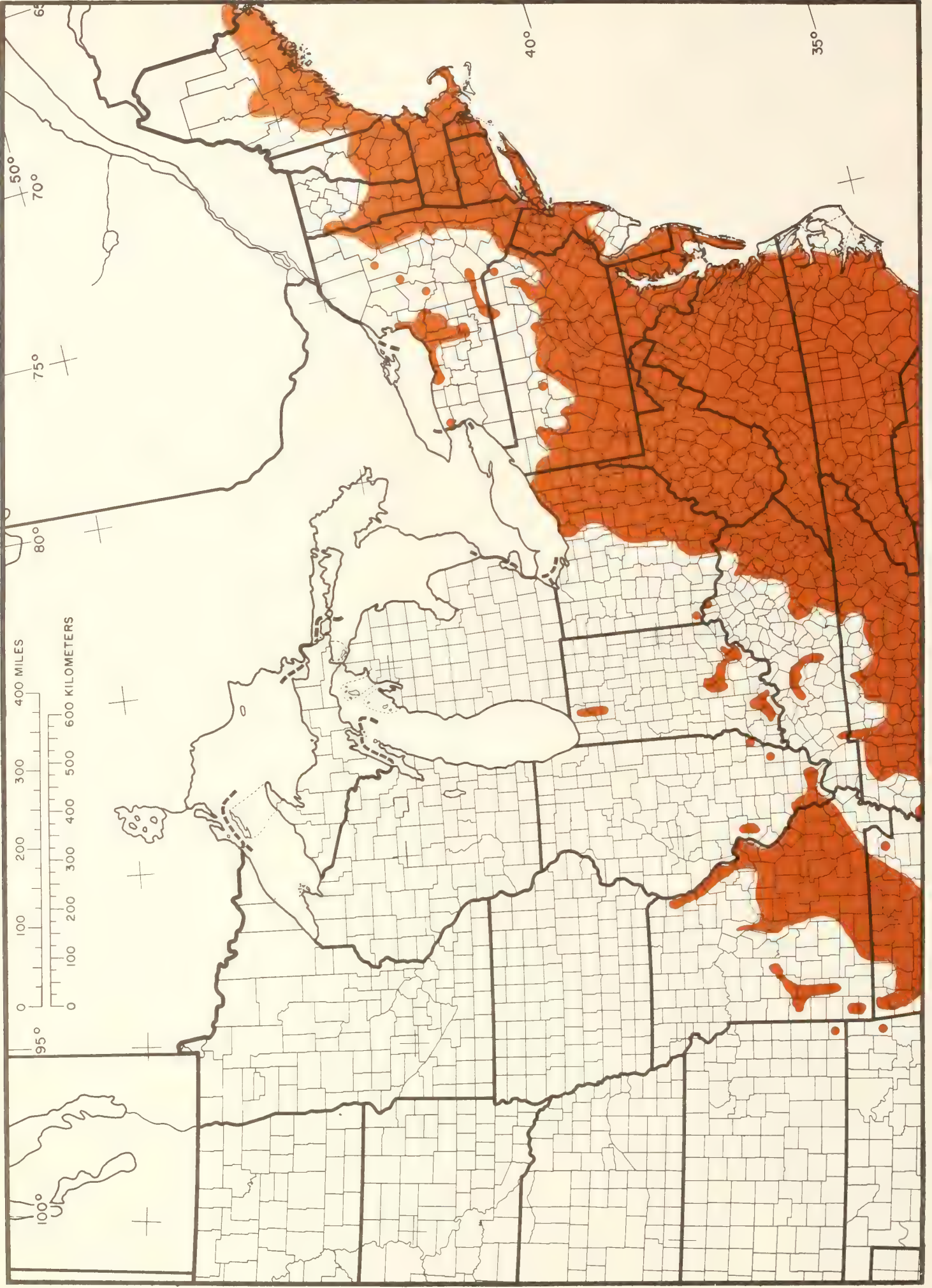
Map 8. *Abnus maritima* (Marsh.) Mühl., seaside alder. Local in s. Del. and e. shore of Md. and in s. Okla.



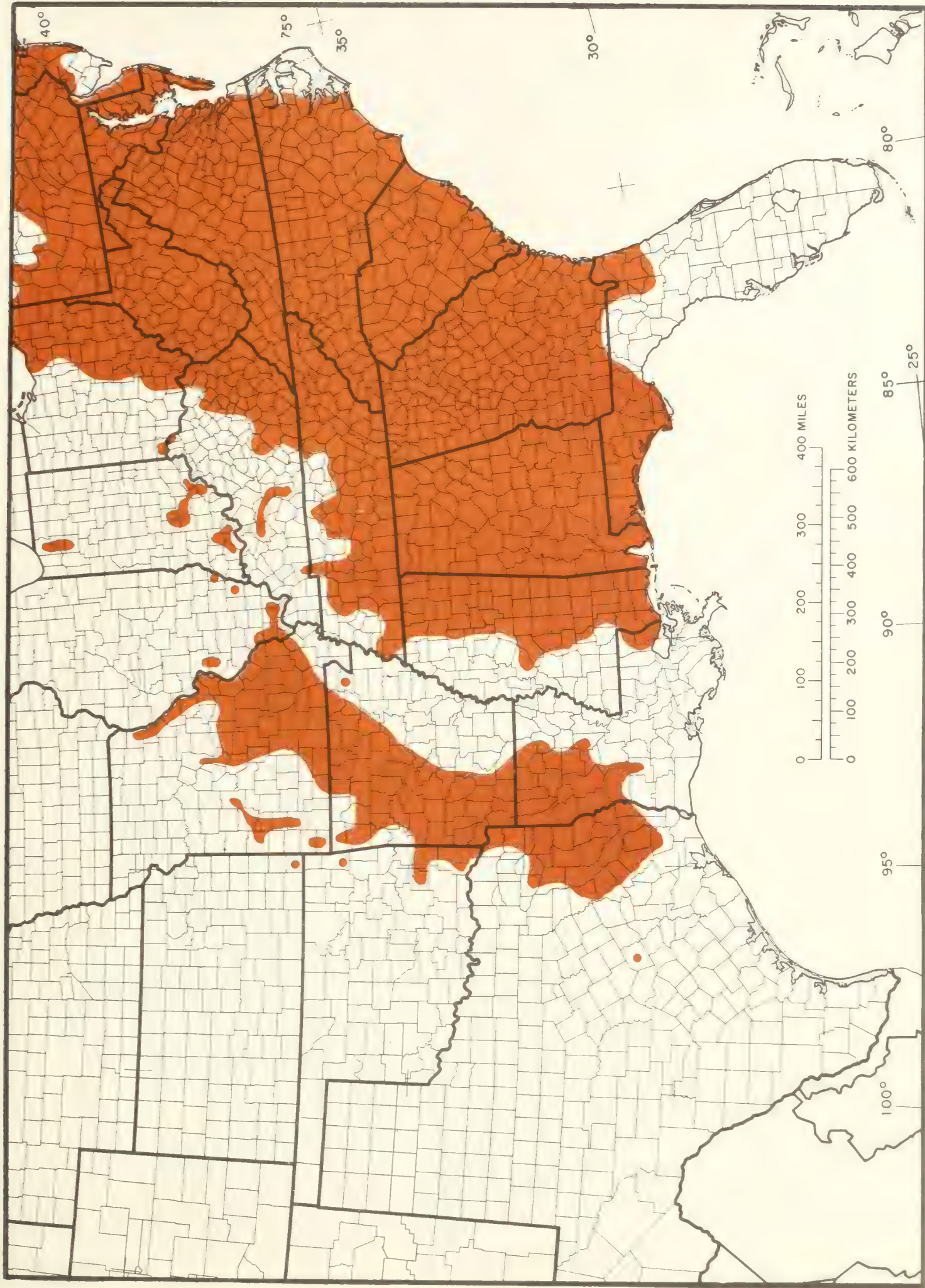
Map 9-N. *Alnus rugosa* (Du Roi) Spreng., speckled alder.



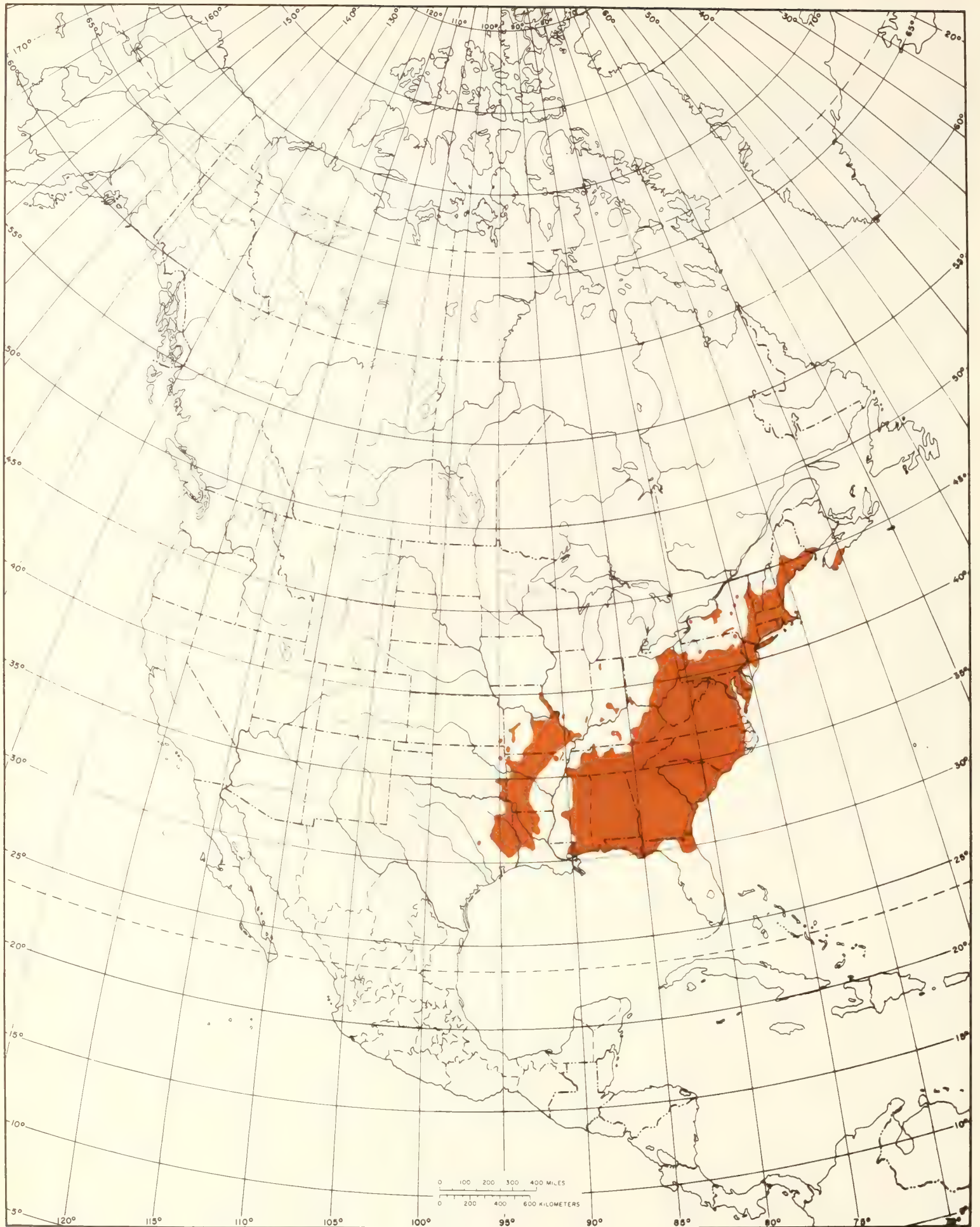
Map 9-NE. *Alnus rugosa* (Du Roi) Spreng., speckled alder.



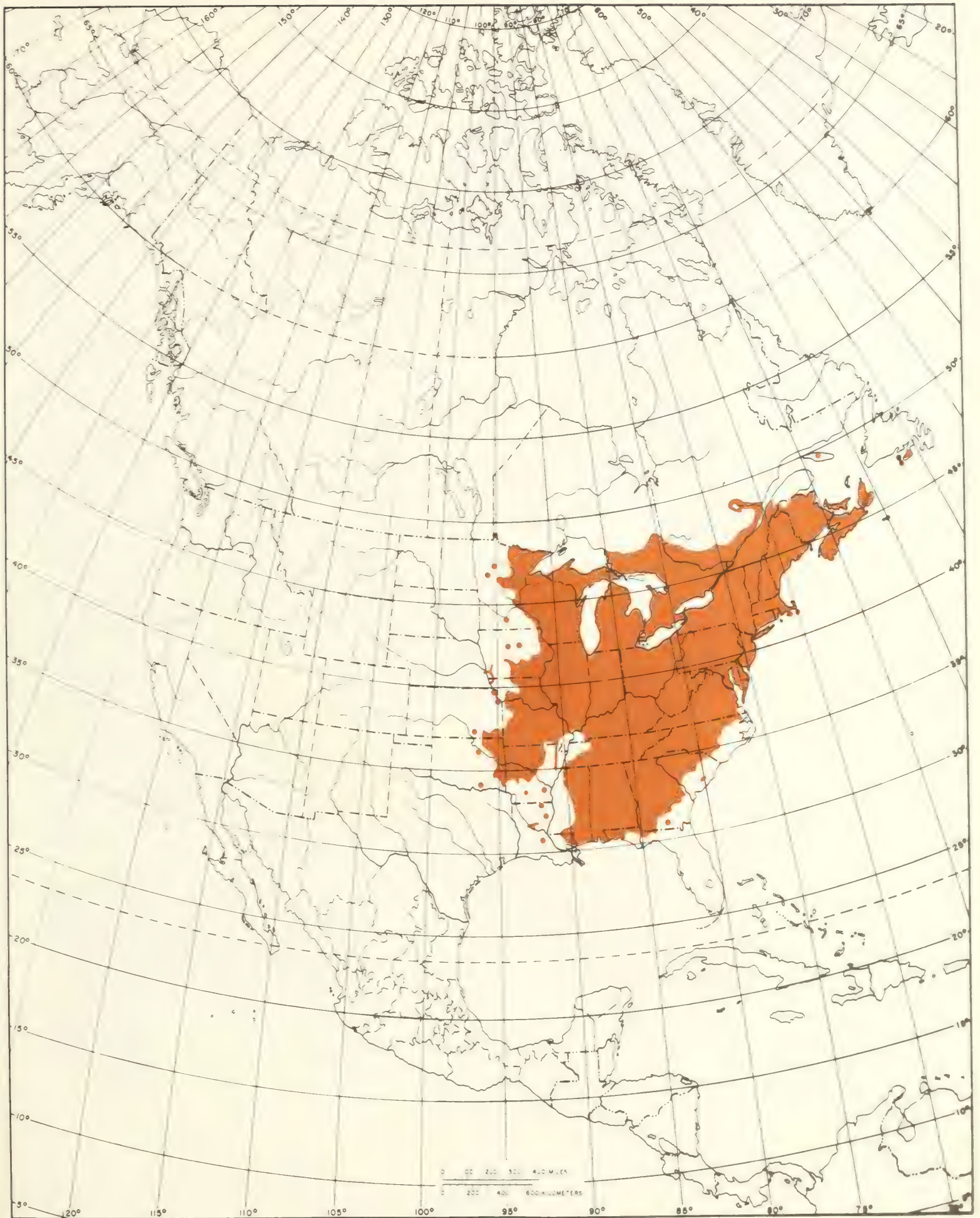
Map 10-NE. *Alnus serrulata* (Ait.) Willd., hazel alder.



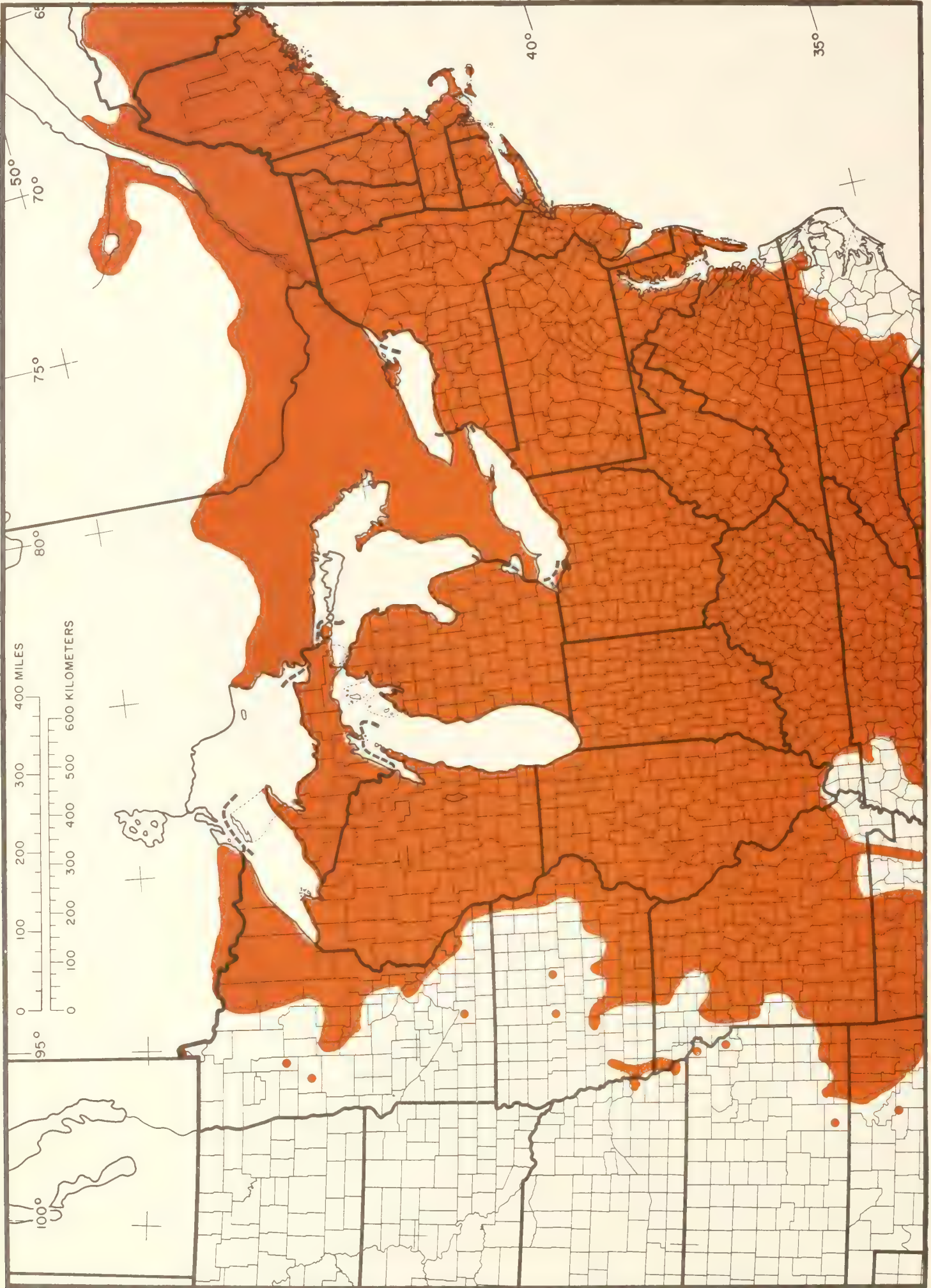
Map 10-SE. *Alnus serrulata* (Willd.) Willd., hazel alder.



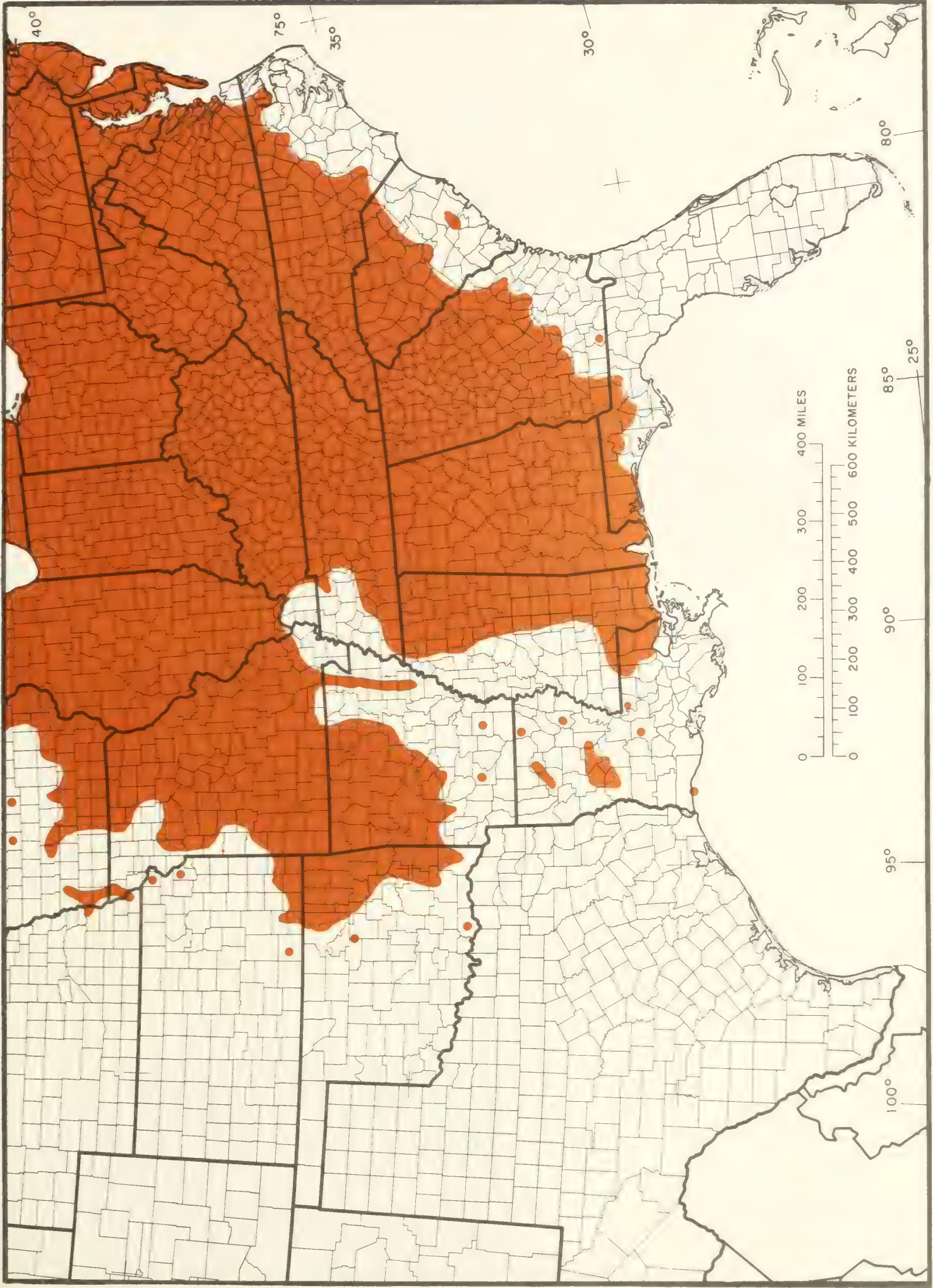
Map 10-N. *Alnus serrulata* (Ait.) Willd., hazel alder.



Map 11-N. *Amelanchier arborea* (Michx. f.) Fern., downy serviceberry.



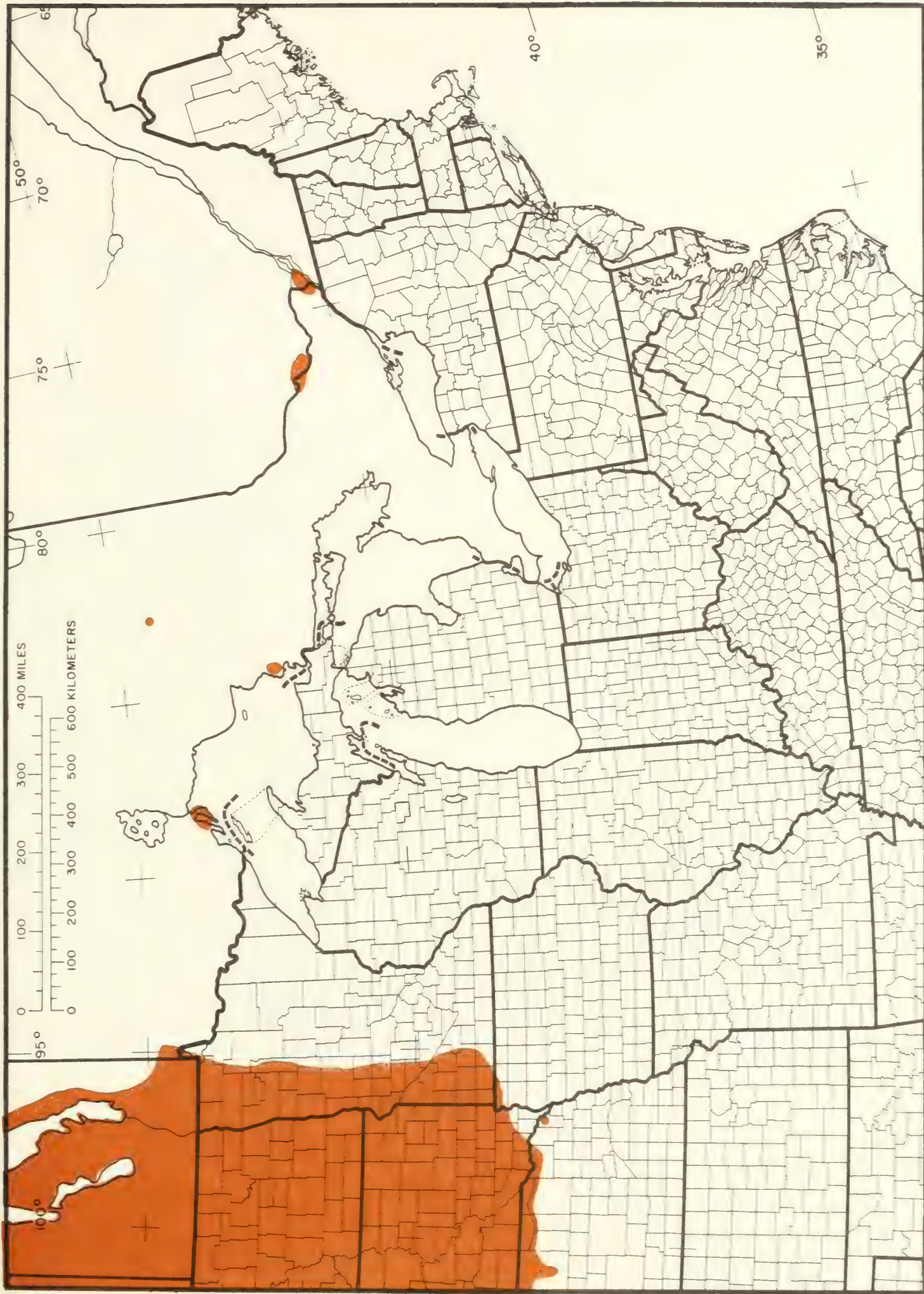
Map 11-N.E. *Amelanchier arborea* (Michx. f.) Fern., downy serviceberry.



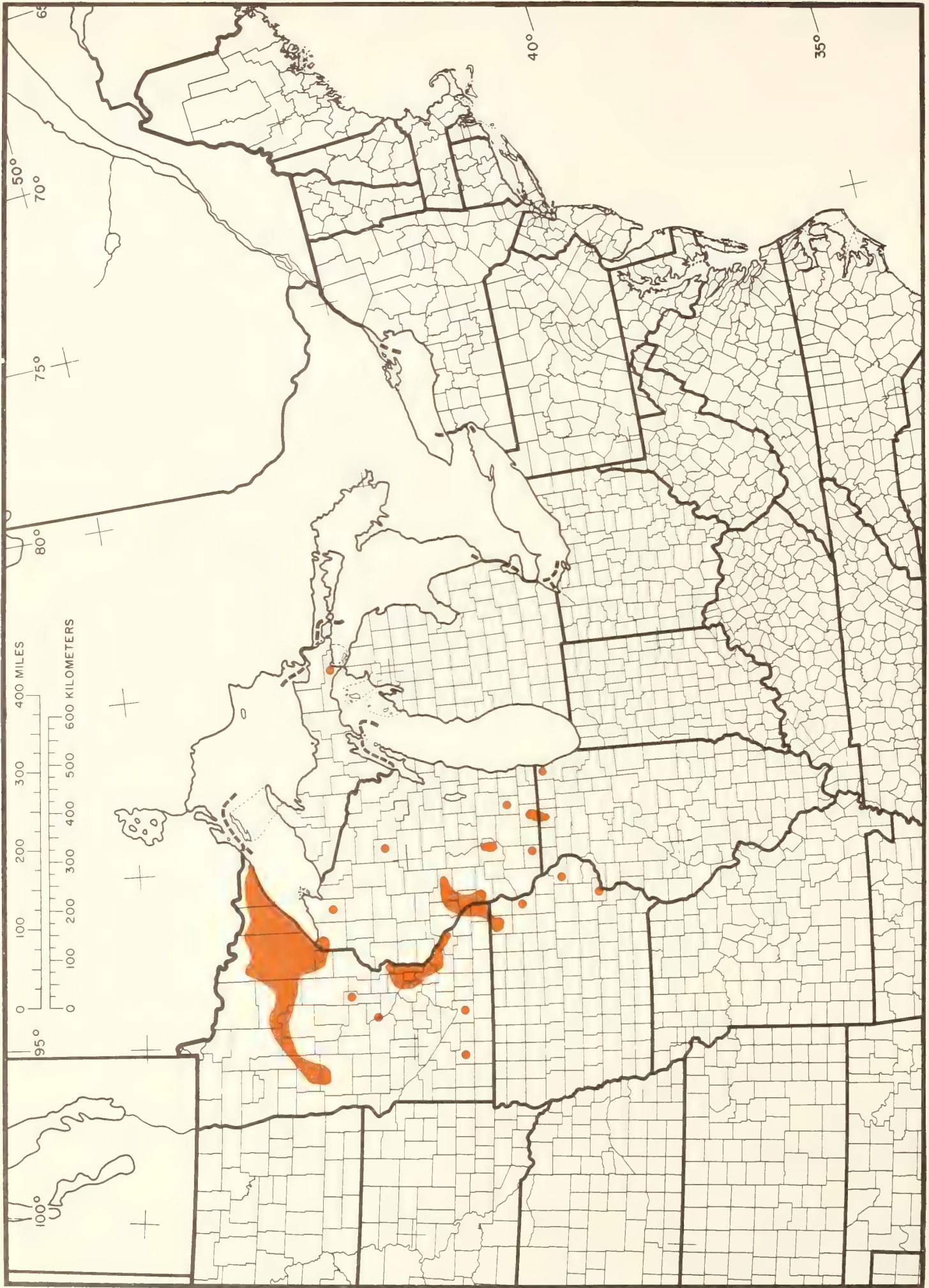
Map 11-SE. *Amelanchier arborea* (Vlchx. f.) Fern., downy serviceberry.



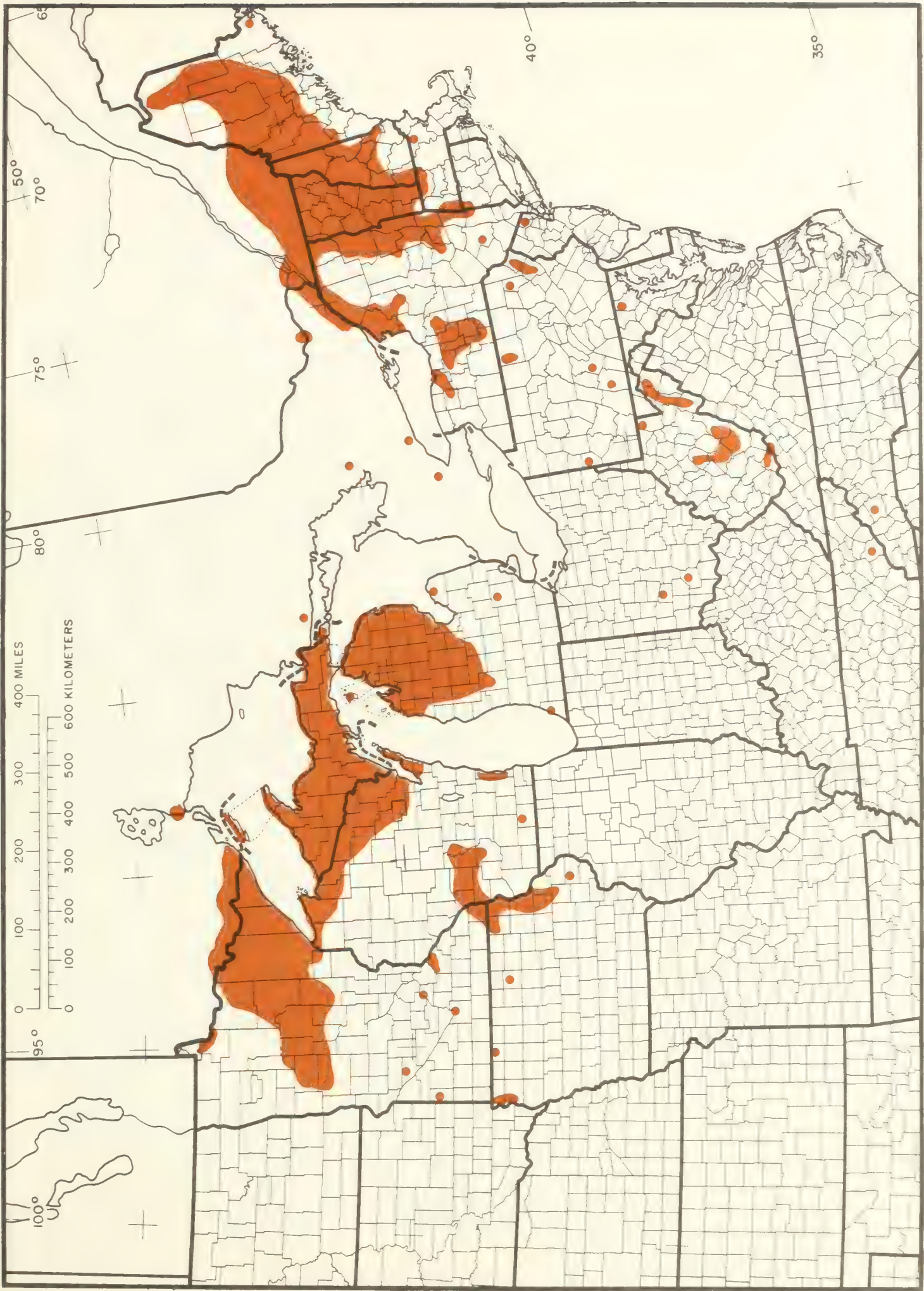
Map 12-N. *Amelanchier alnifolia* (Nutt.) Nutt., western serviceberry.



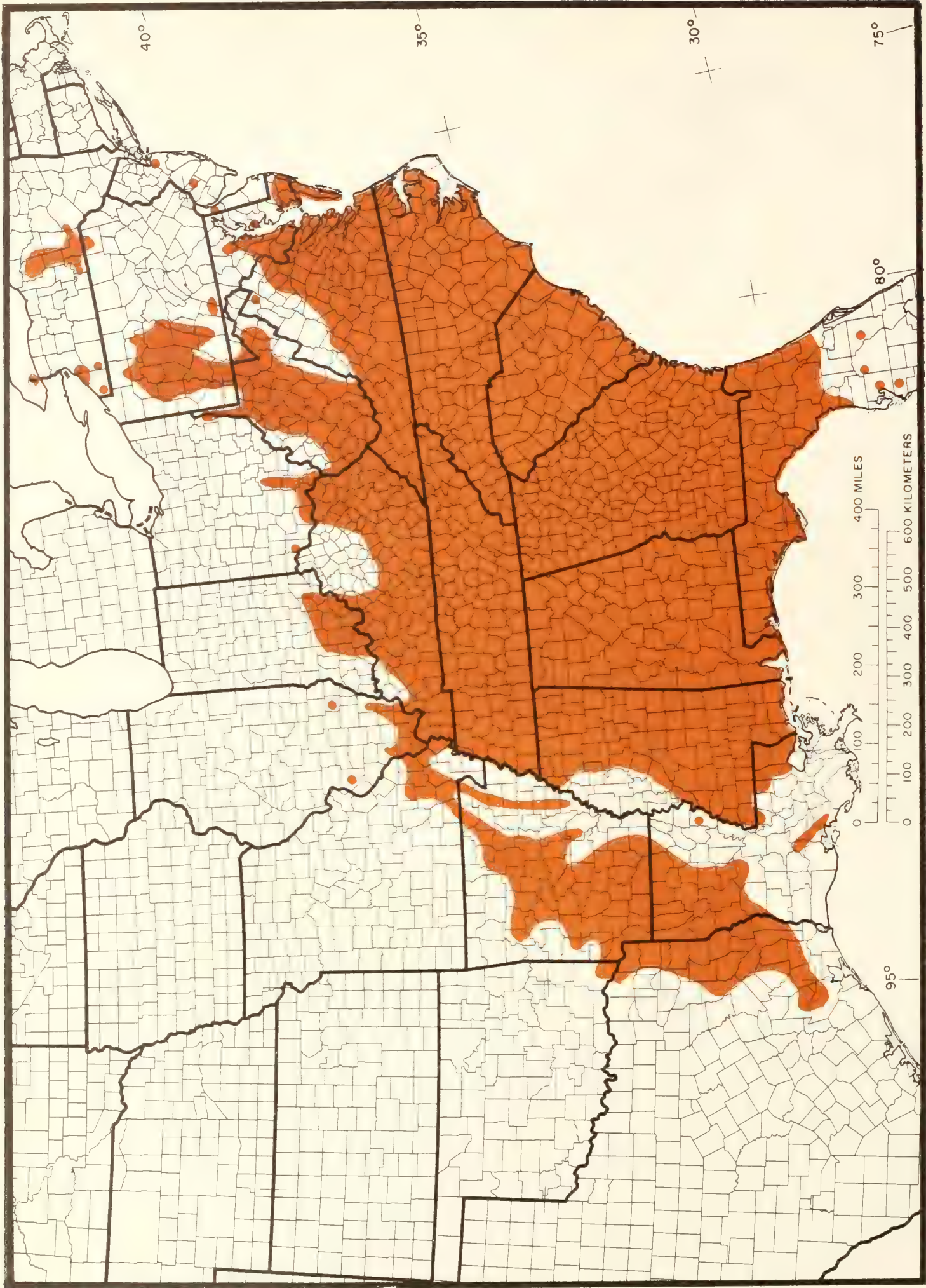
Map 12-NE. *Amelanchier alnifolia* (Nutt.) Nutt., western serviceberry. Western range in Volume 3.



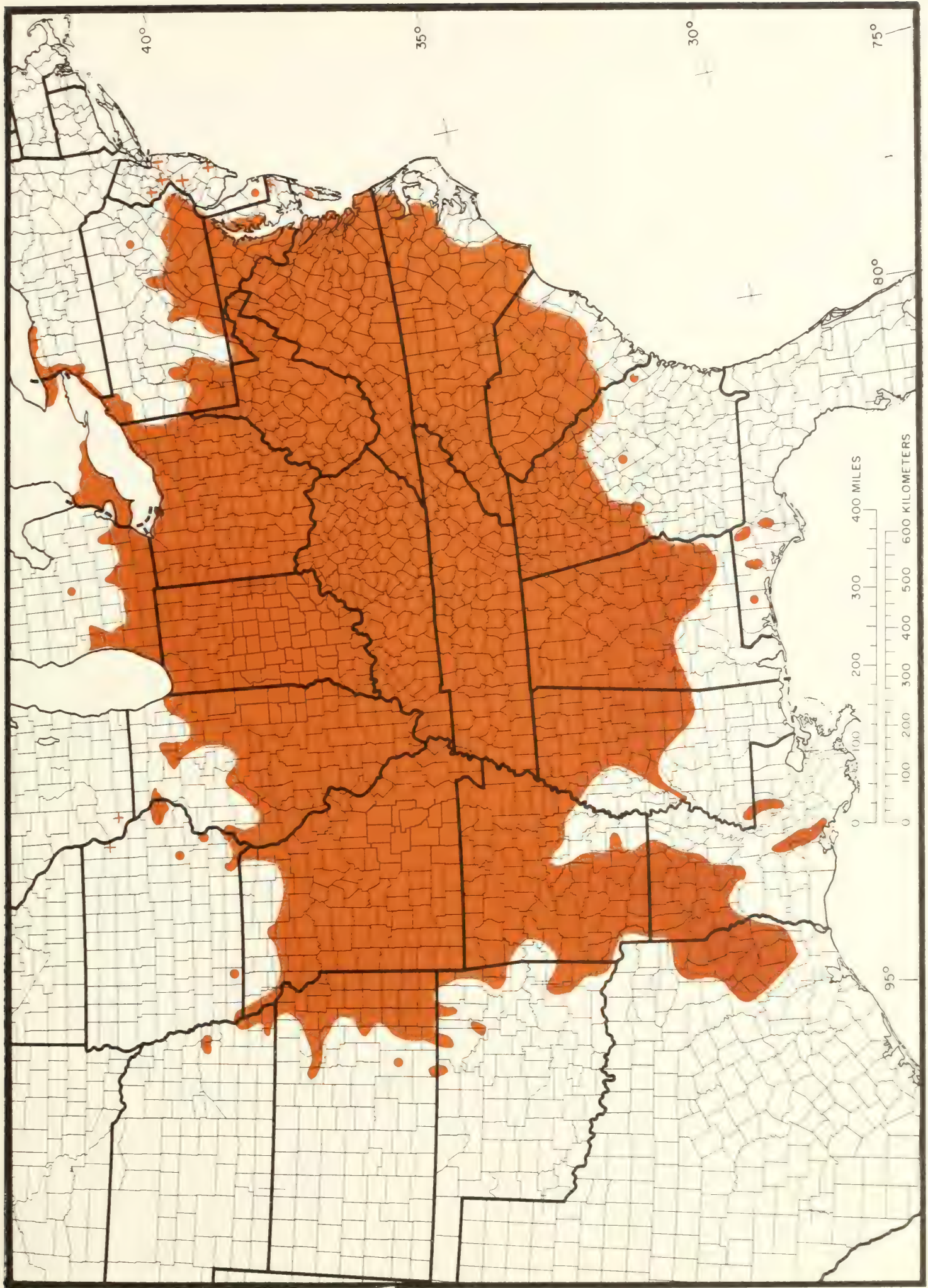
Map 13. *Amelanchier interior* Nielsen, inland serviceberry.



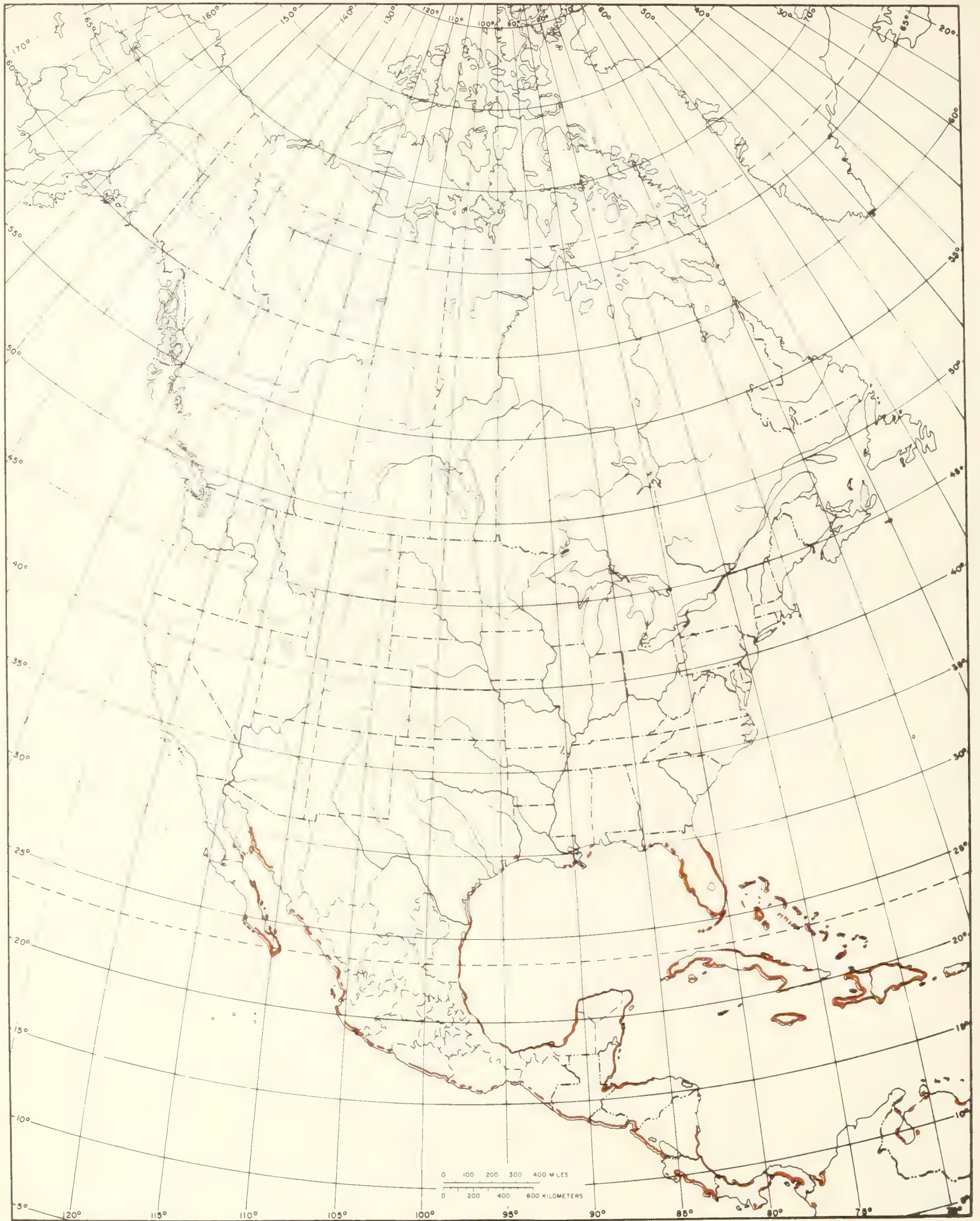
Map 11. *Amelanchier sanguinea* (Pursh) DC., rounded-leaf serviceberry



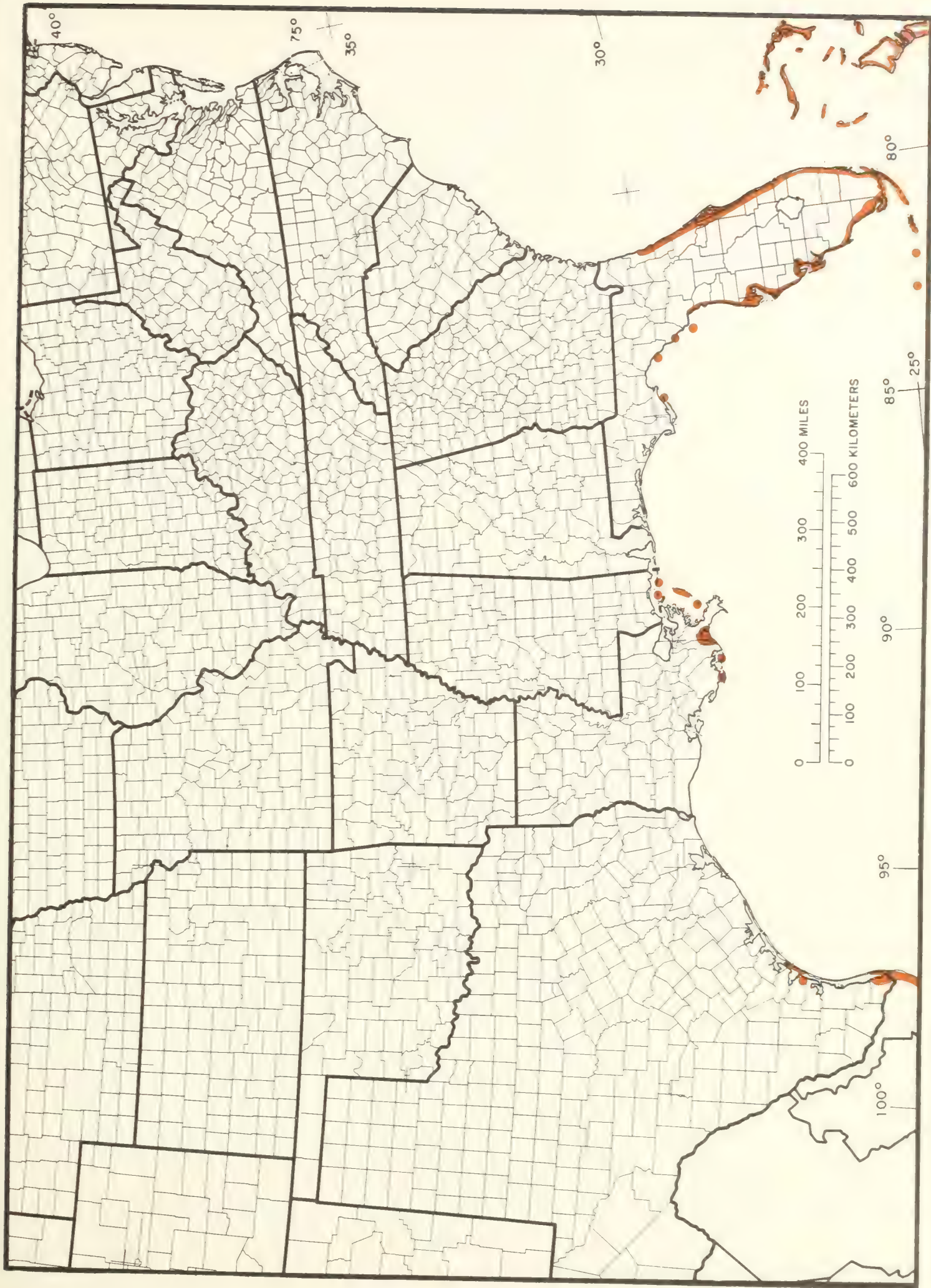
Map 15. *Aralia spinosa* L., devil's-walkingstick.



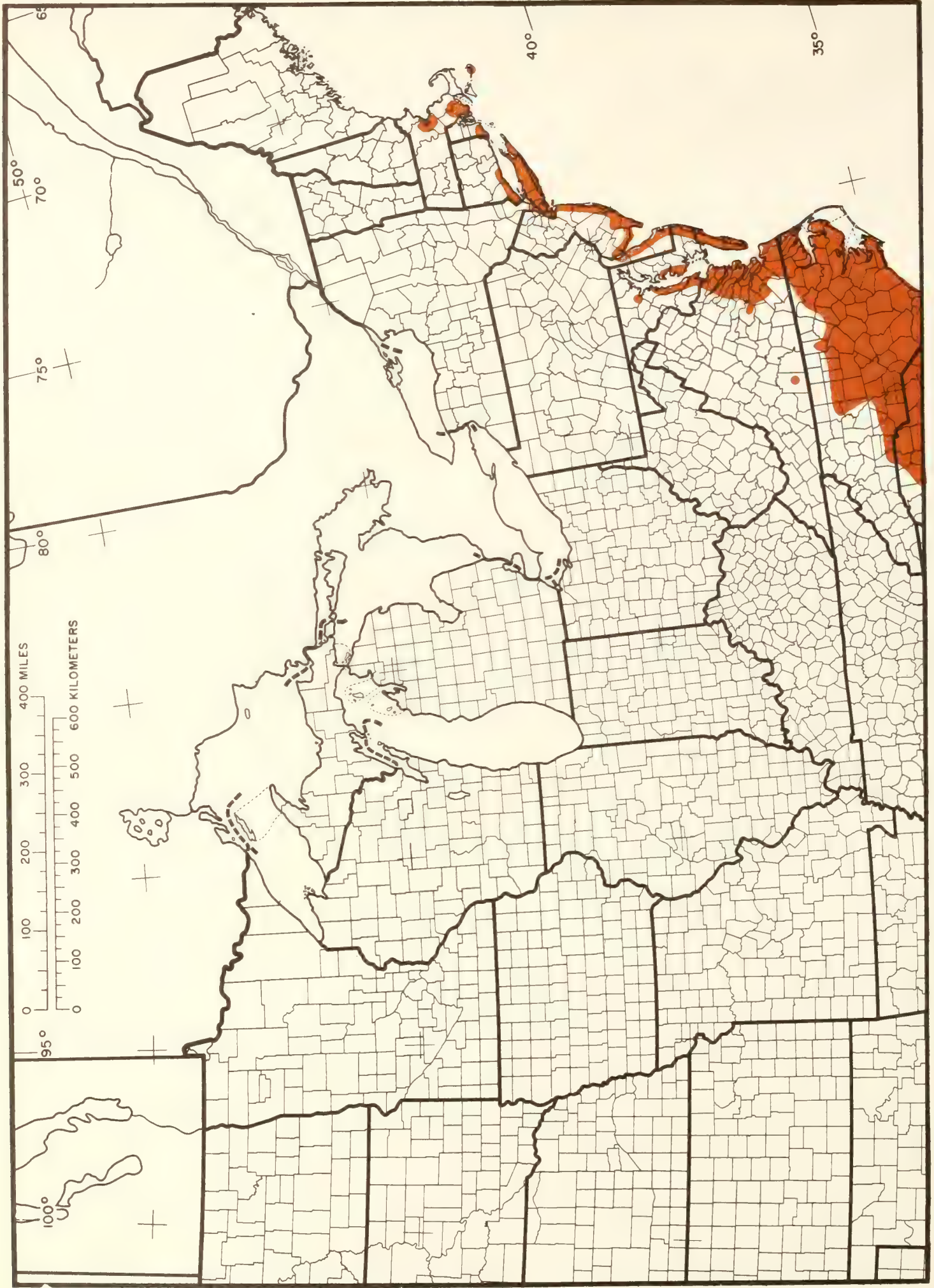
Map 16. *Asimina triloba* (L.) Dunal, paw paw.



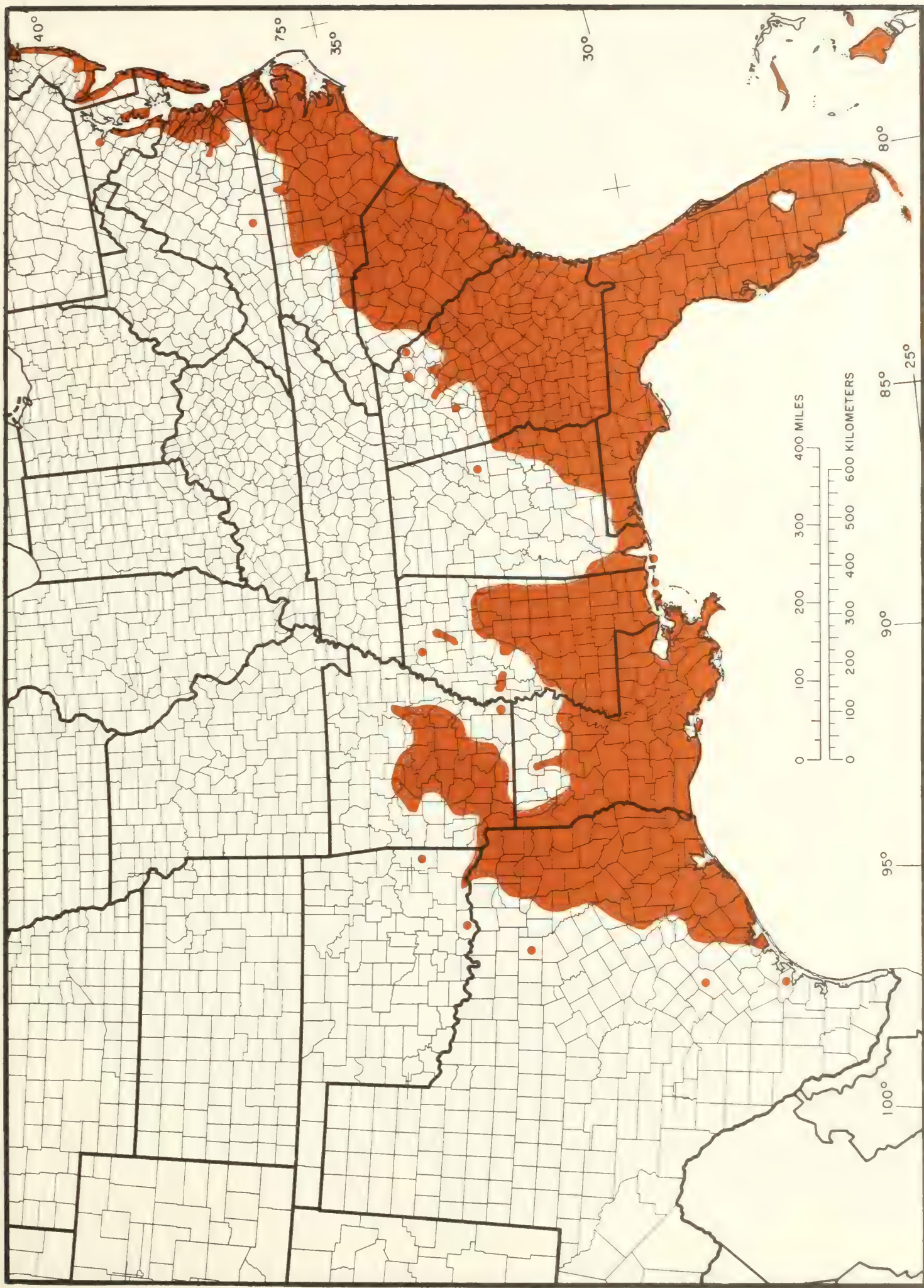
Map 17-N. *Avicennia germinans* (L.) L., black-mangrove. Widely distributed on coasts of tropical America in West Indies, including Bahamas, P. R., and V. I., Mex., C. Am., and S. Am.



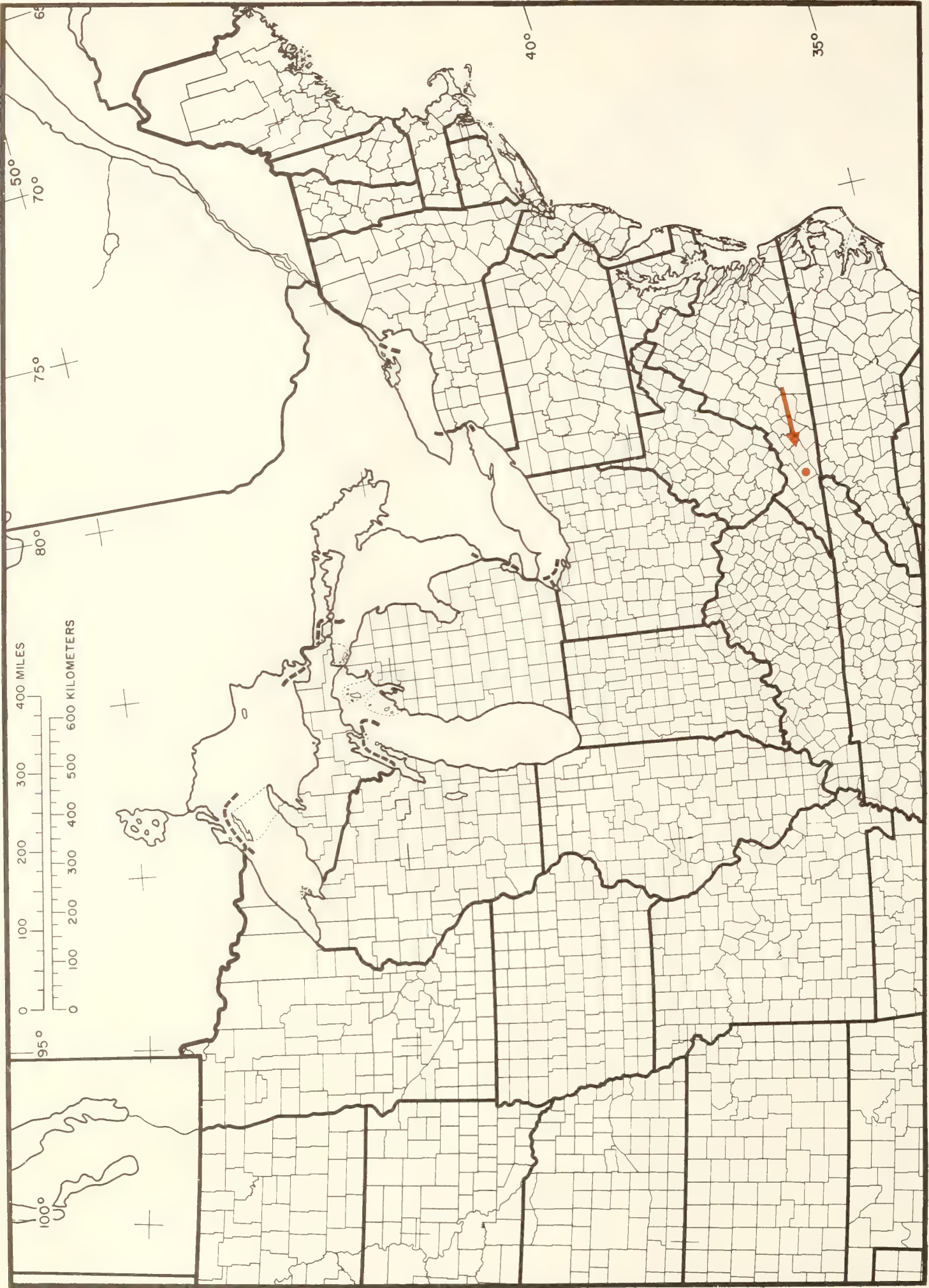
Map 17. *Avicennia germinans* (L.) L., black mangrove.



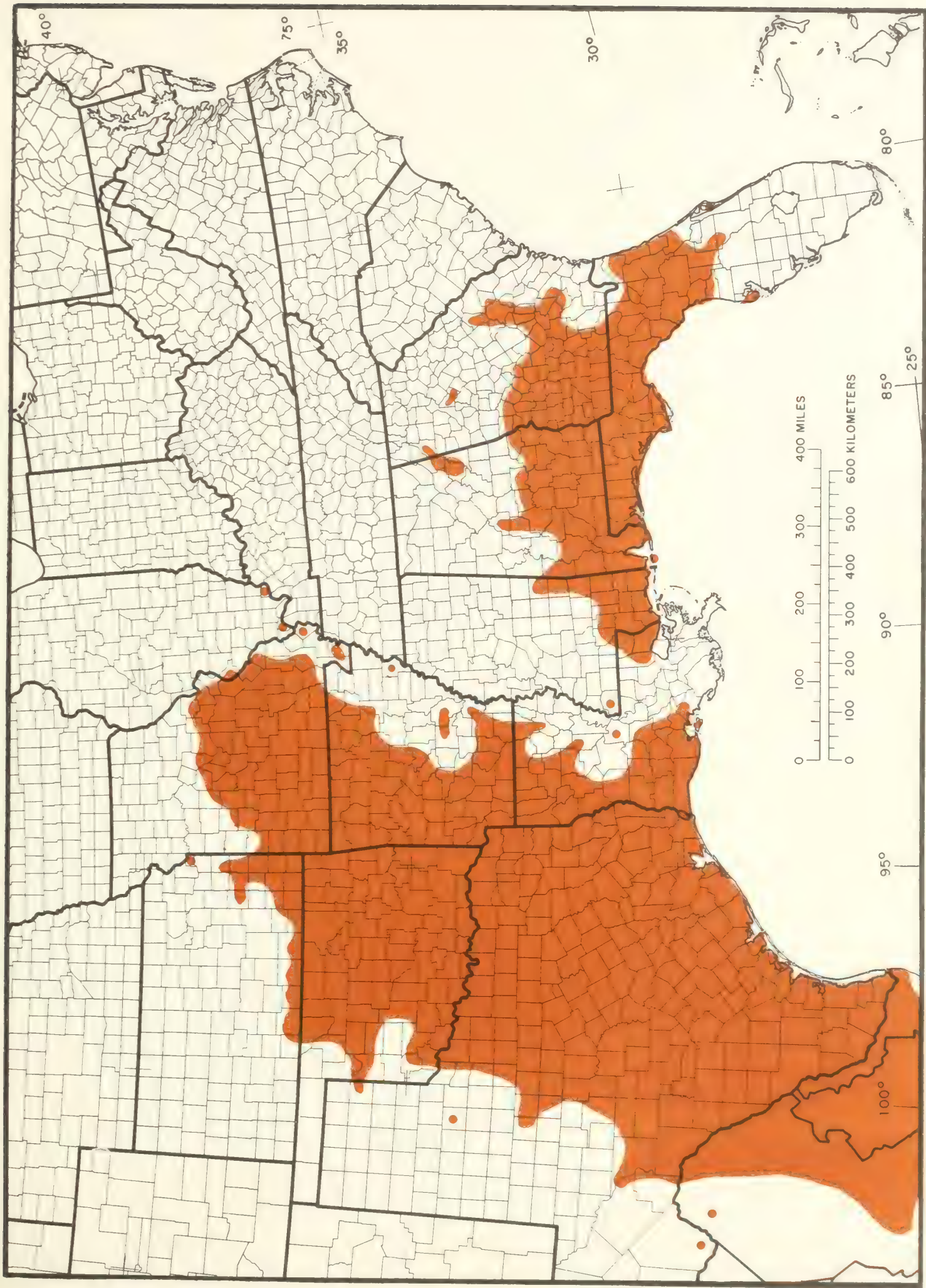
Map 18-NE. *Baccharis halimifolia* L., eastern baccharis.



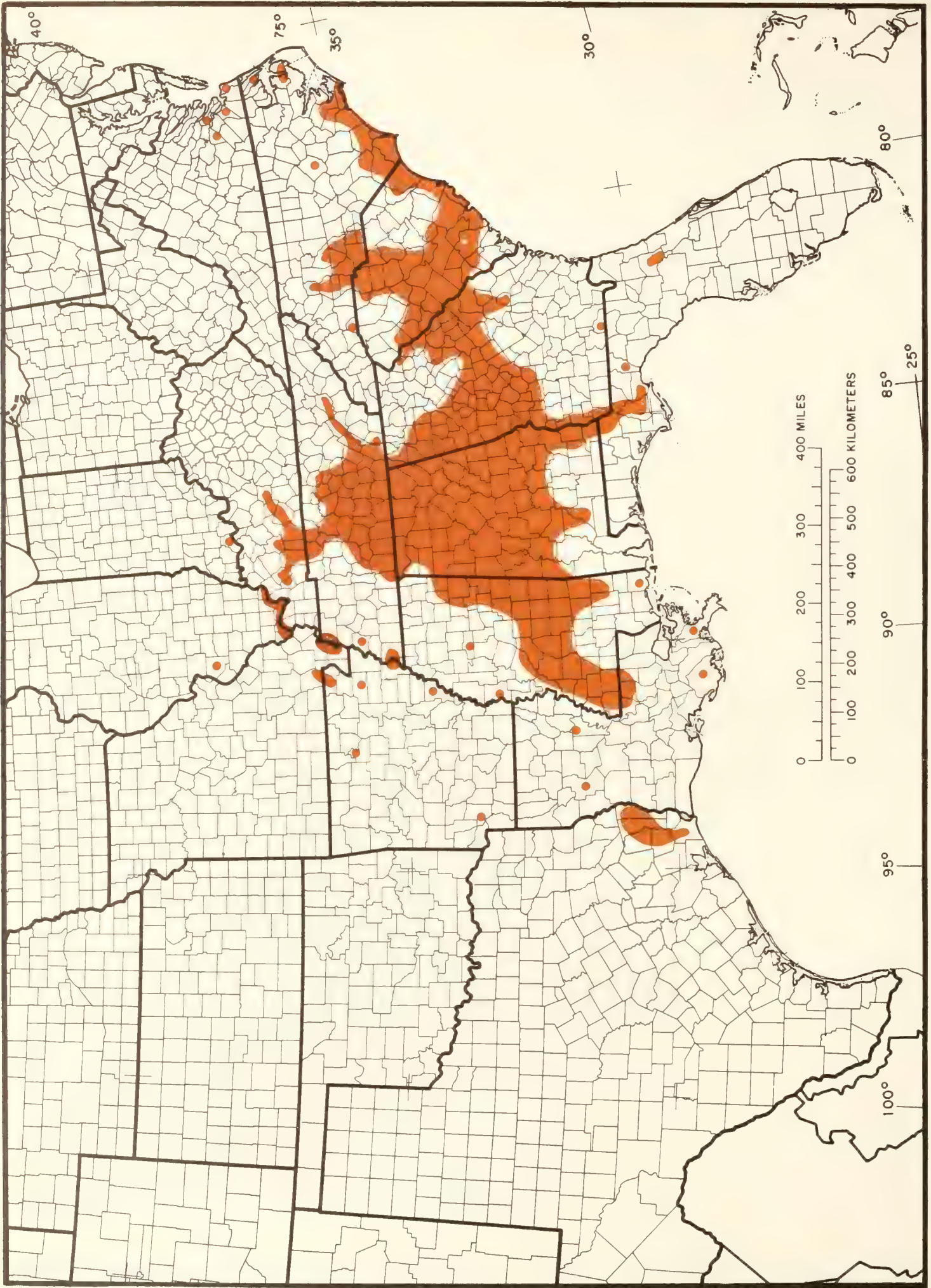
Map 18.-SE. *Baccharis halimifolia* L., eastern baccharis. Also Bahamas and a var. in Cuba.



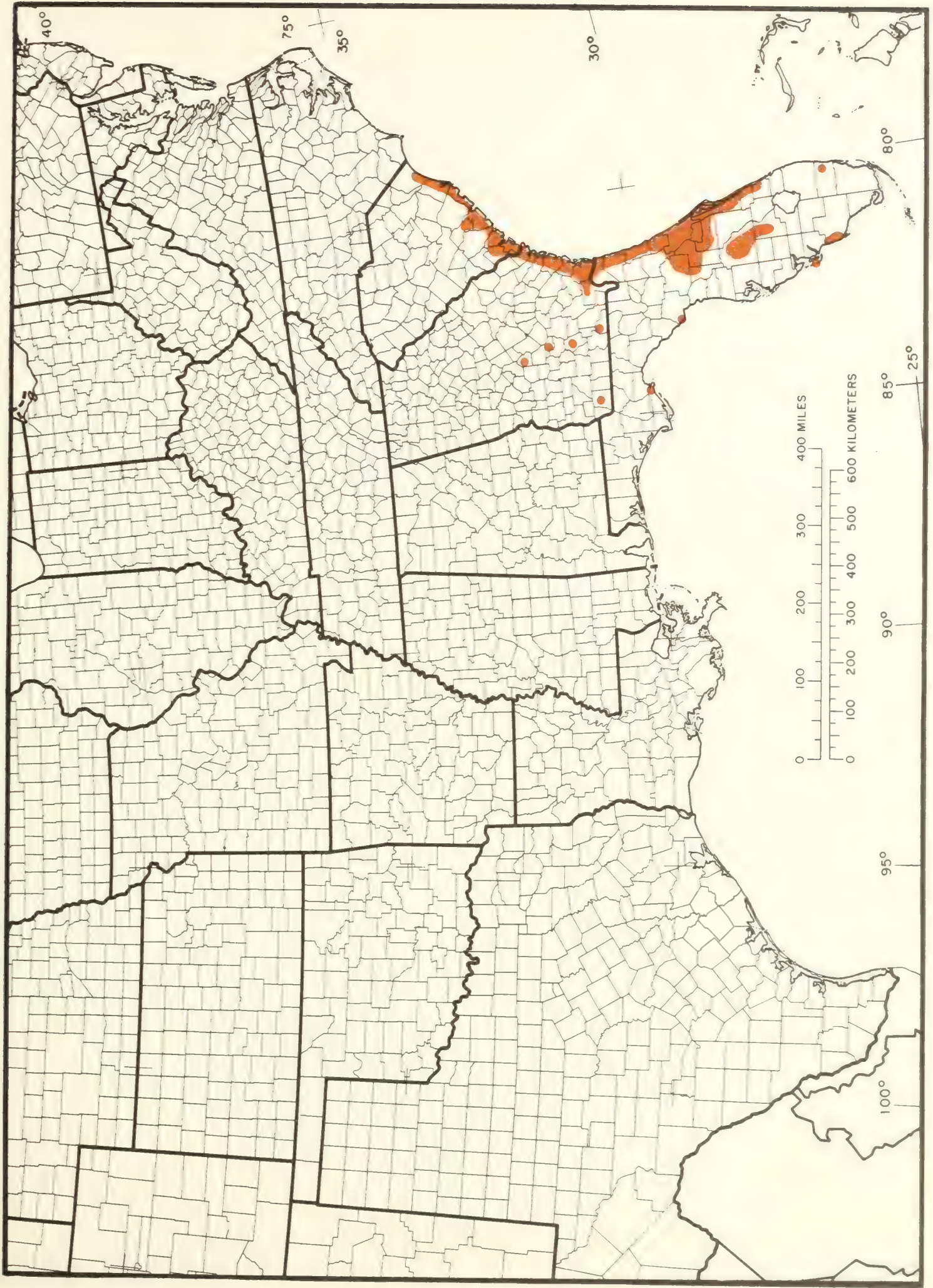
Map 19. *Betula uber* (Ashe) Fern., Ashe birch. Very local in sw. Va. (Smyth Co.).



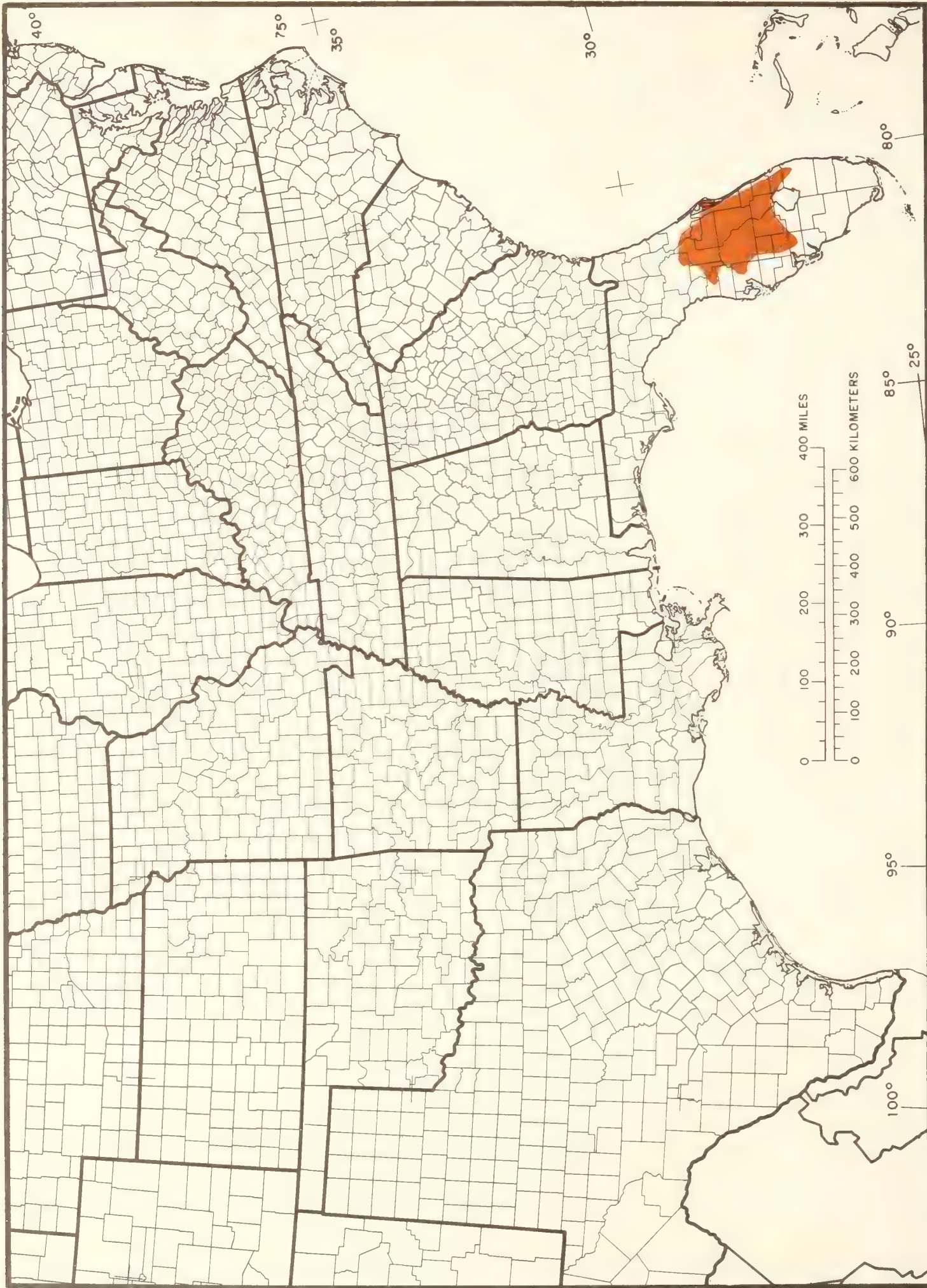
Map 20. *Bumelia lanuginosa* (Michx.) Pers., gum bumelia. Western range in Volume 3.



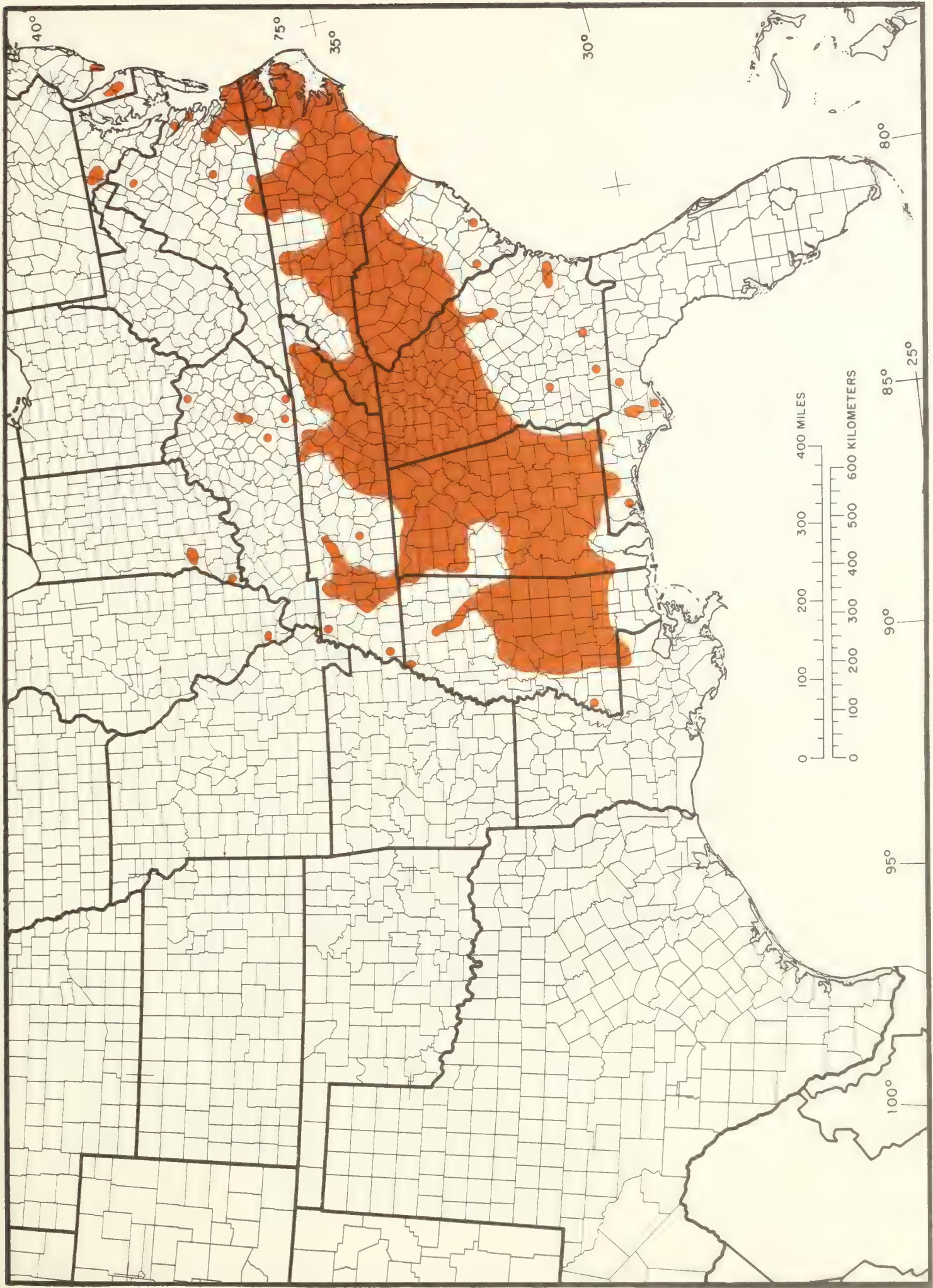
Map 21. *Bumelia lycioides* (L.) Pers., buckthorn bumelia.



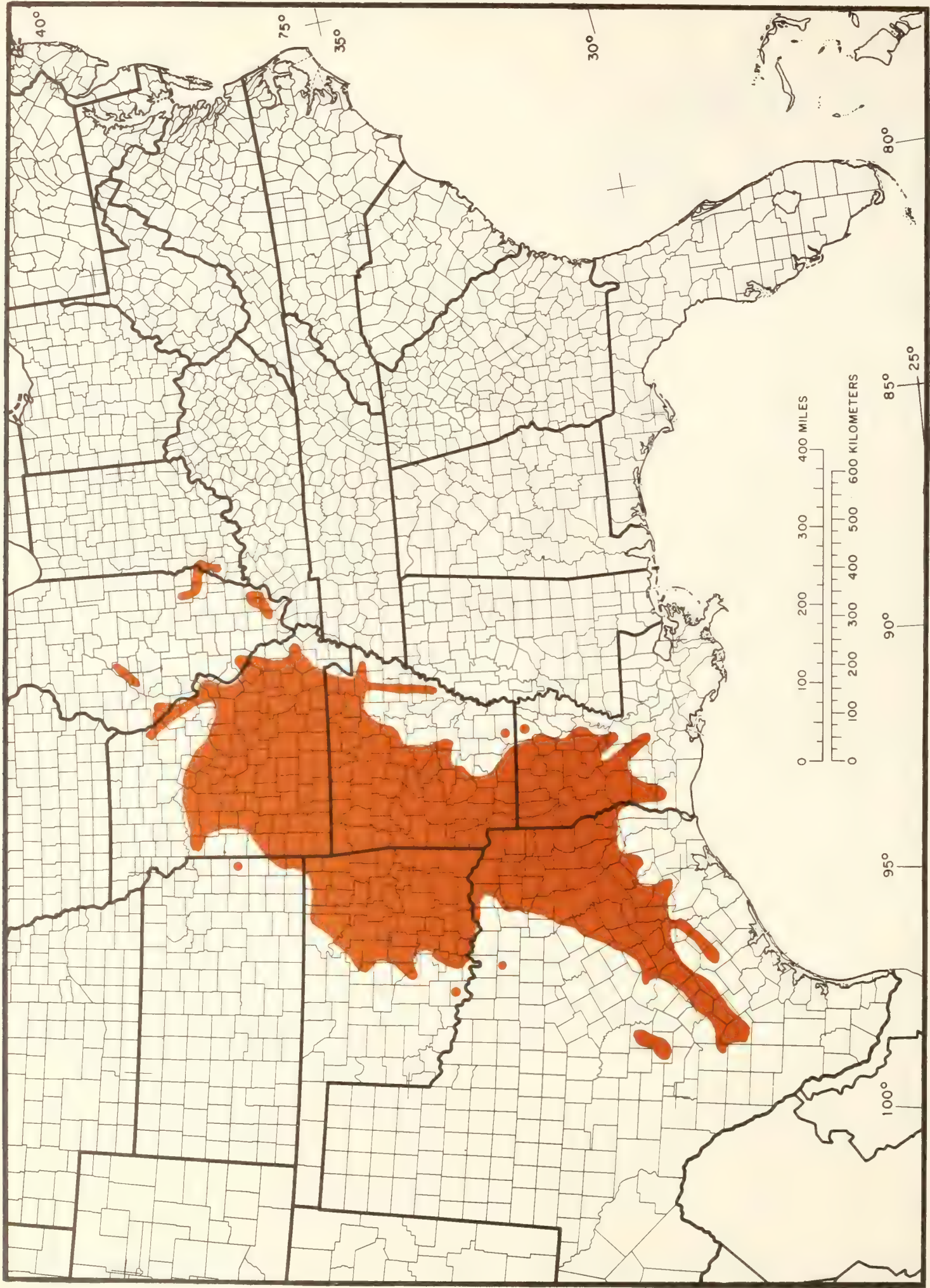
Map 22. *Bunchea tenuis* (L.) Willd., tough bunchea.



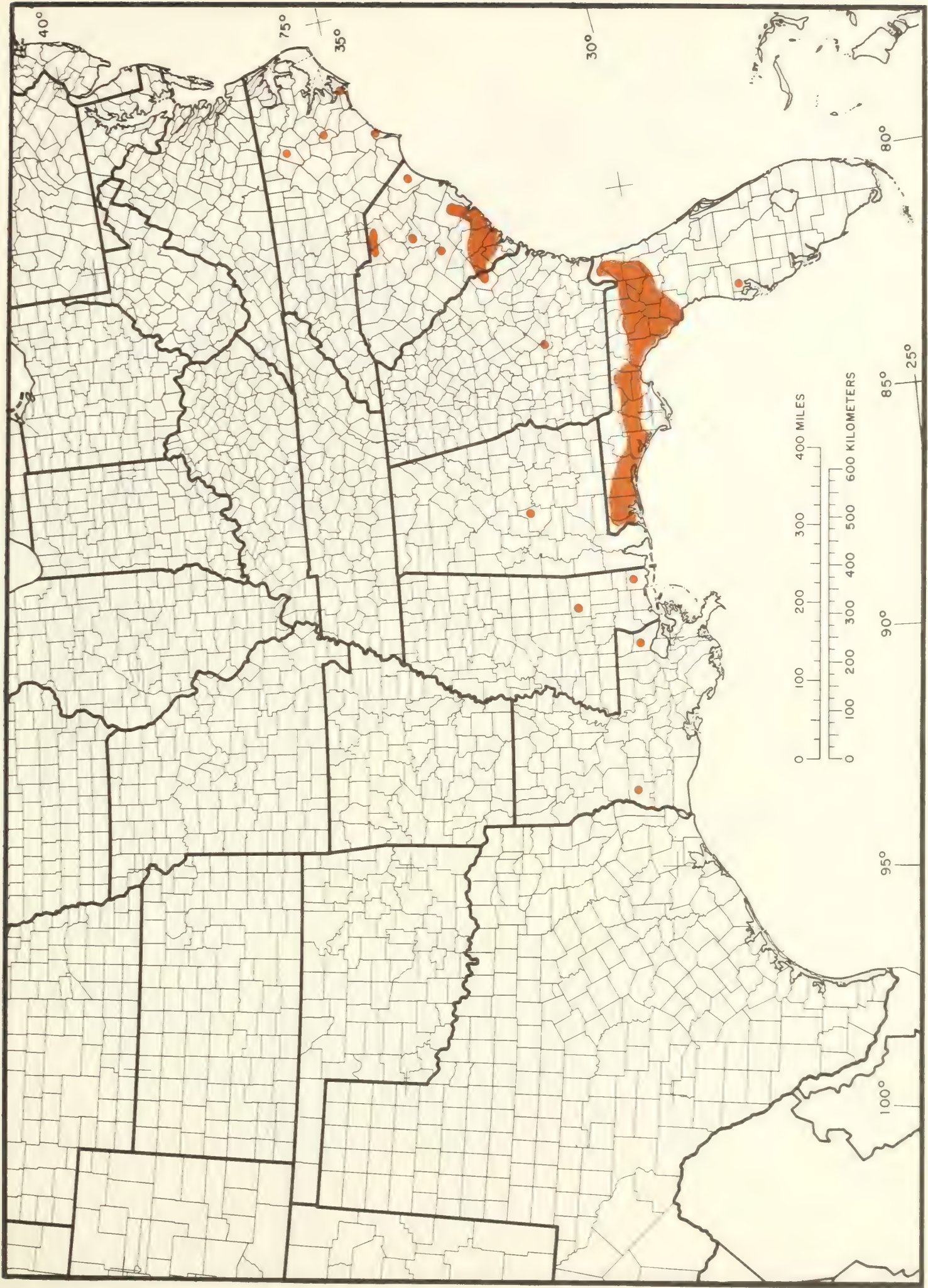
Map 23. *Carya floridana* Sarg., scrub hickory. Local in e. Fla.



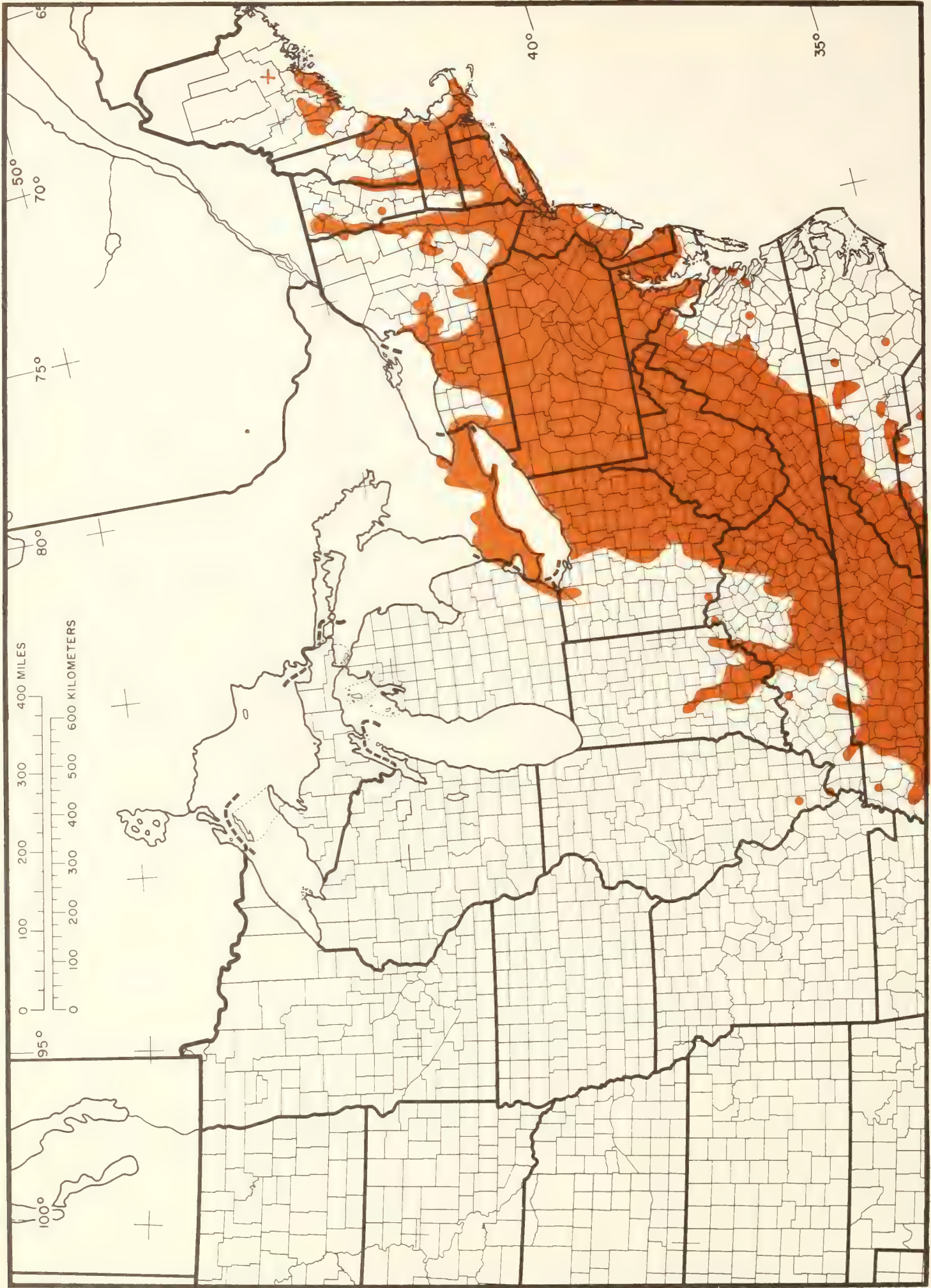
Map 24. *Carya pallida* (Ashe) Engl. & Graebn., sand hickory.



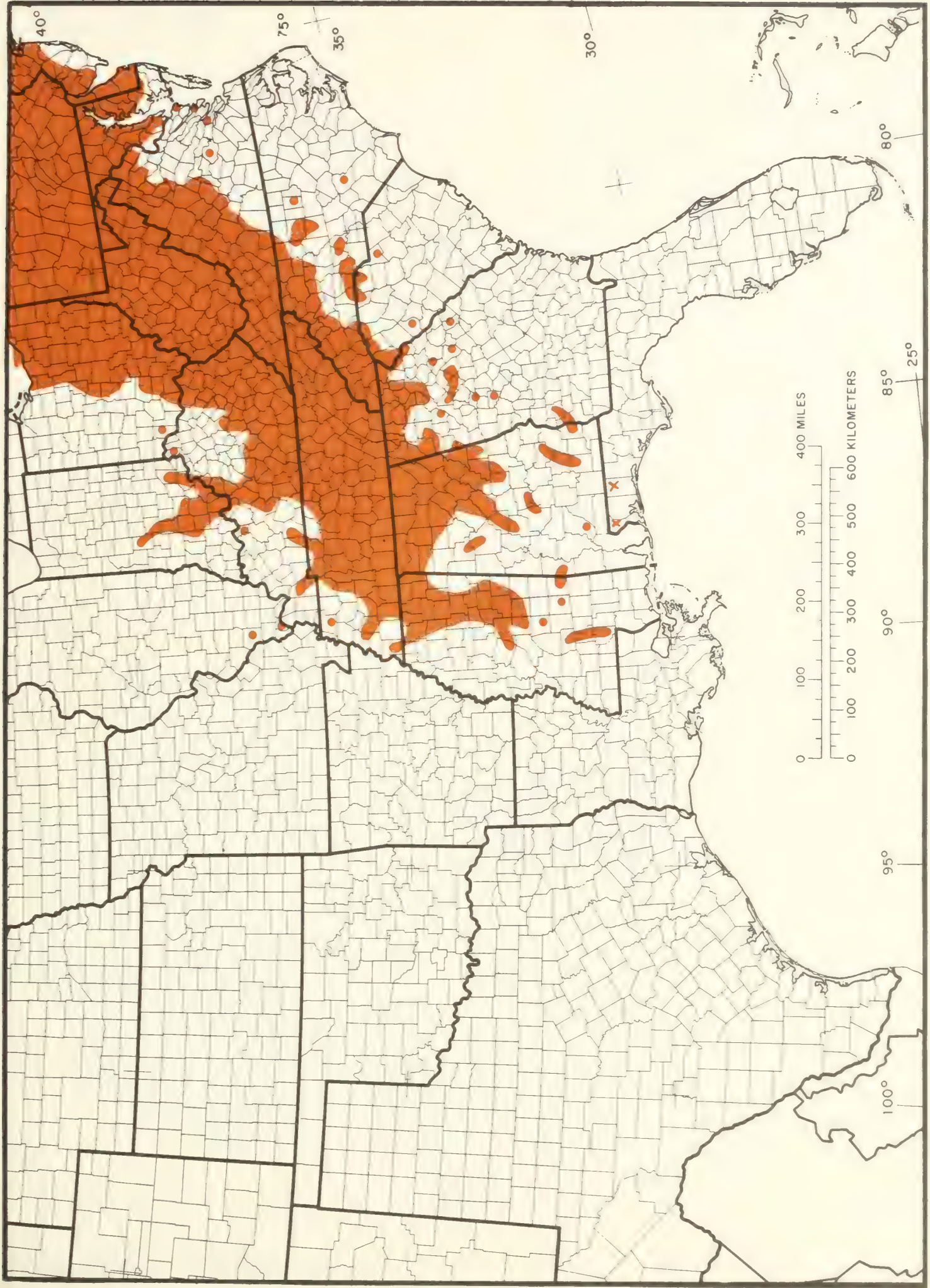
Map 25. *Carya texana* Buckl., black hickory.



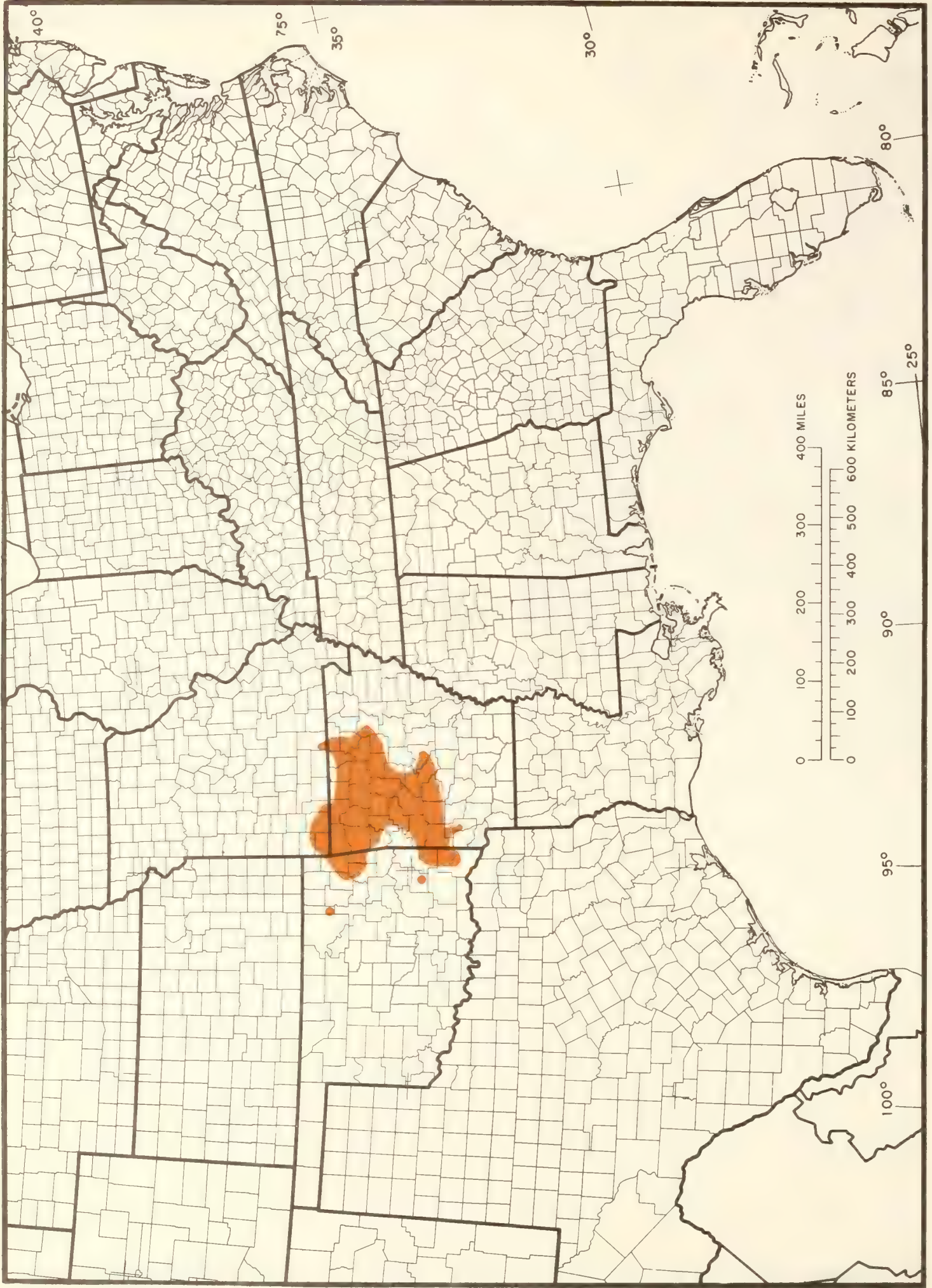
Map 26. *Castanea alnifolia* Nutt., Florida chinkapin.



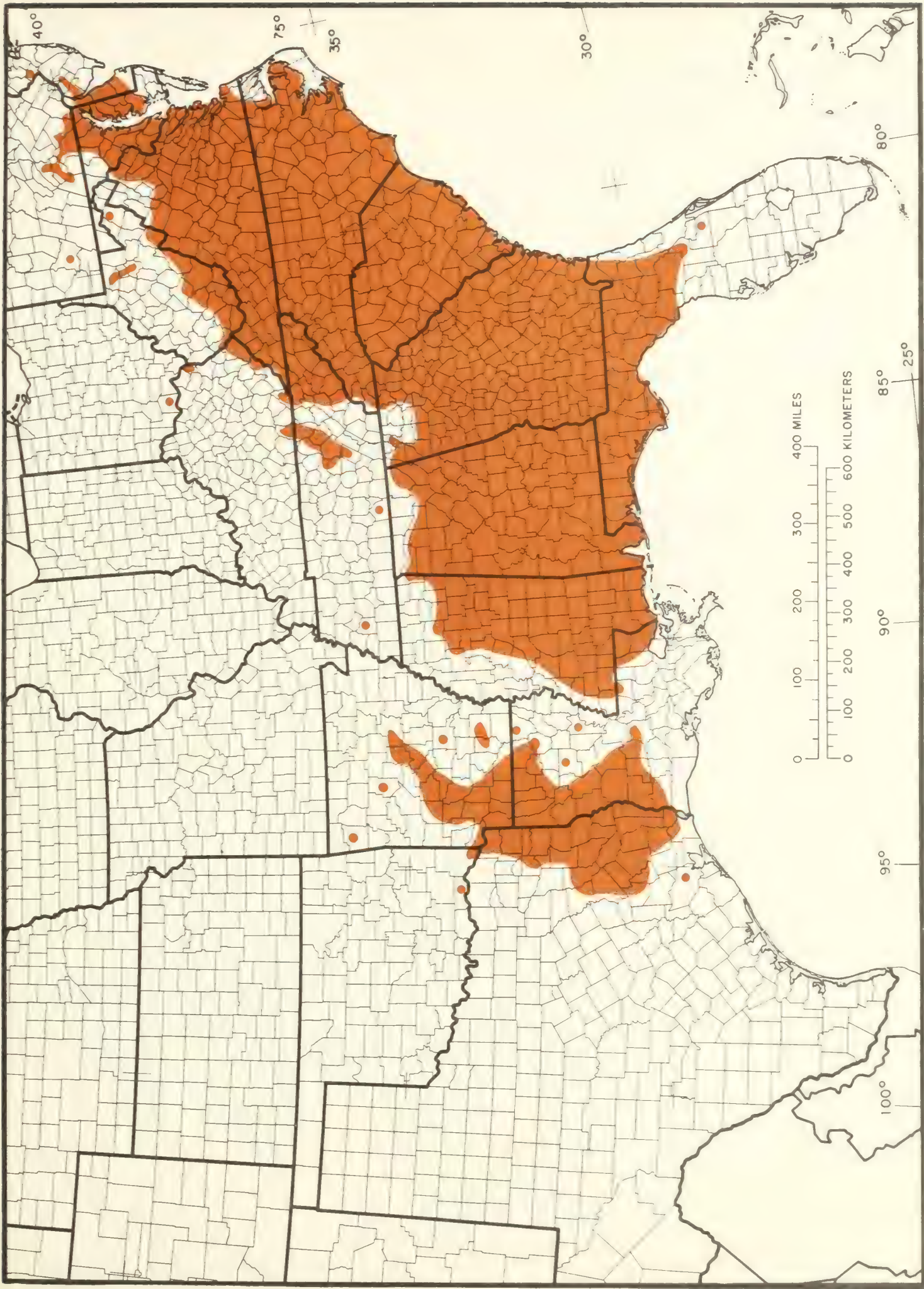
Map 27.-N.E. *Castanea dentata* (Marsh.) Borkh., American chestnut.



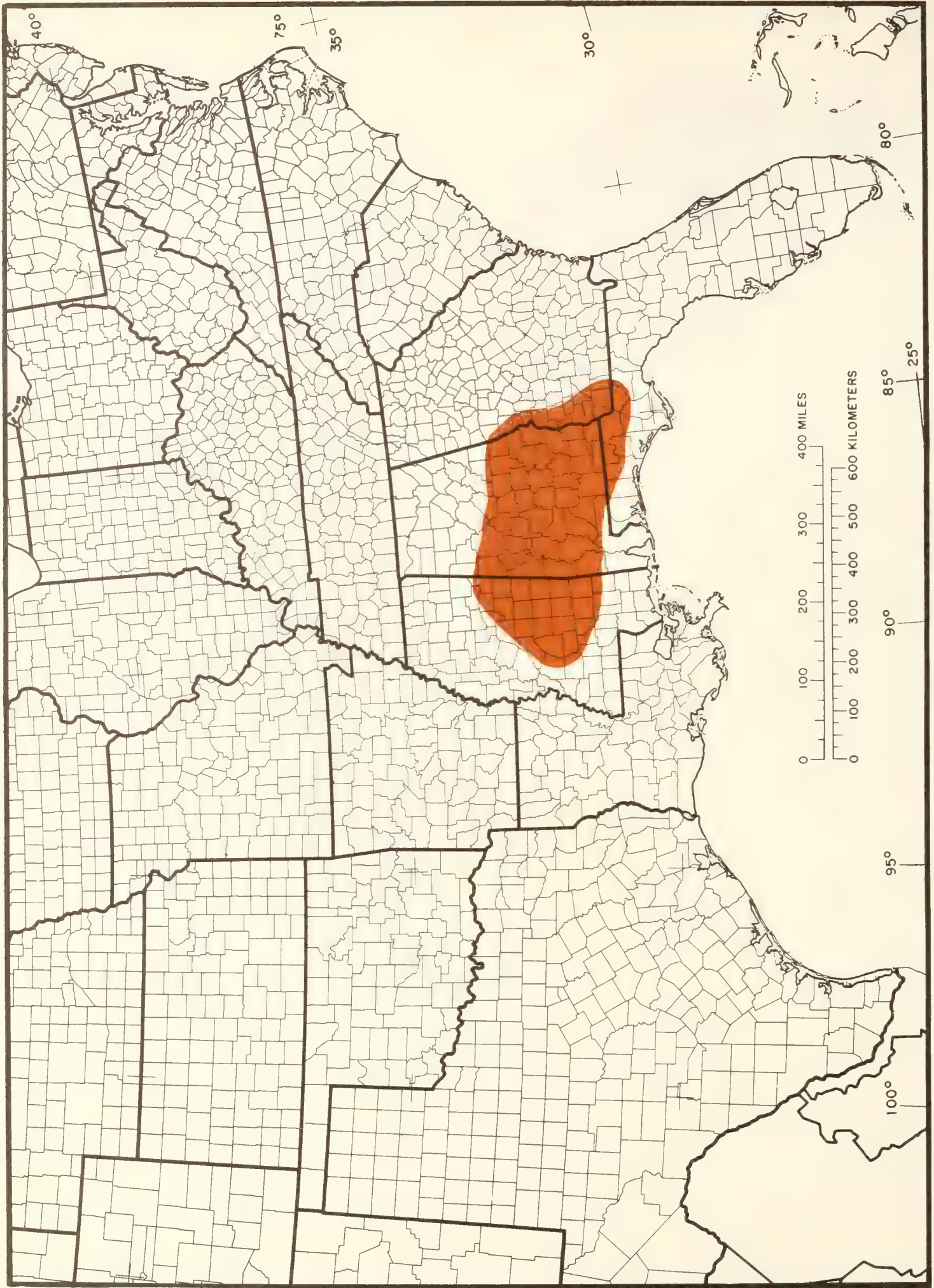
Map 27-1. *Castanea dentata* (Marsh.) Borkh. American chestnut



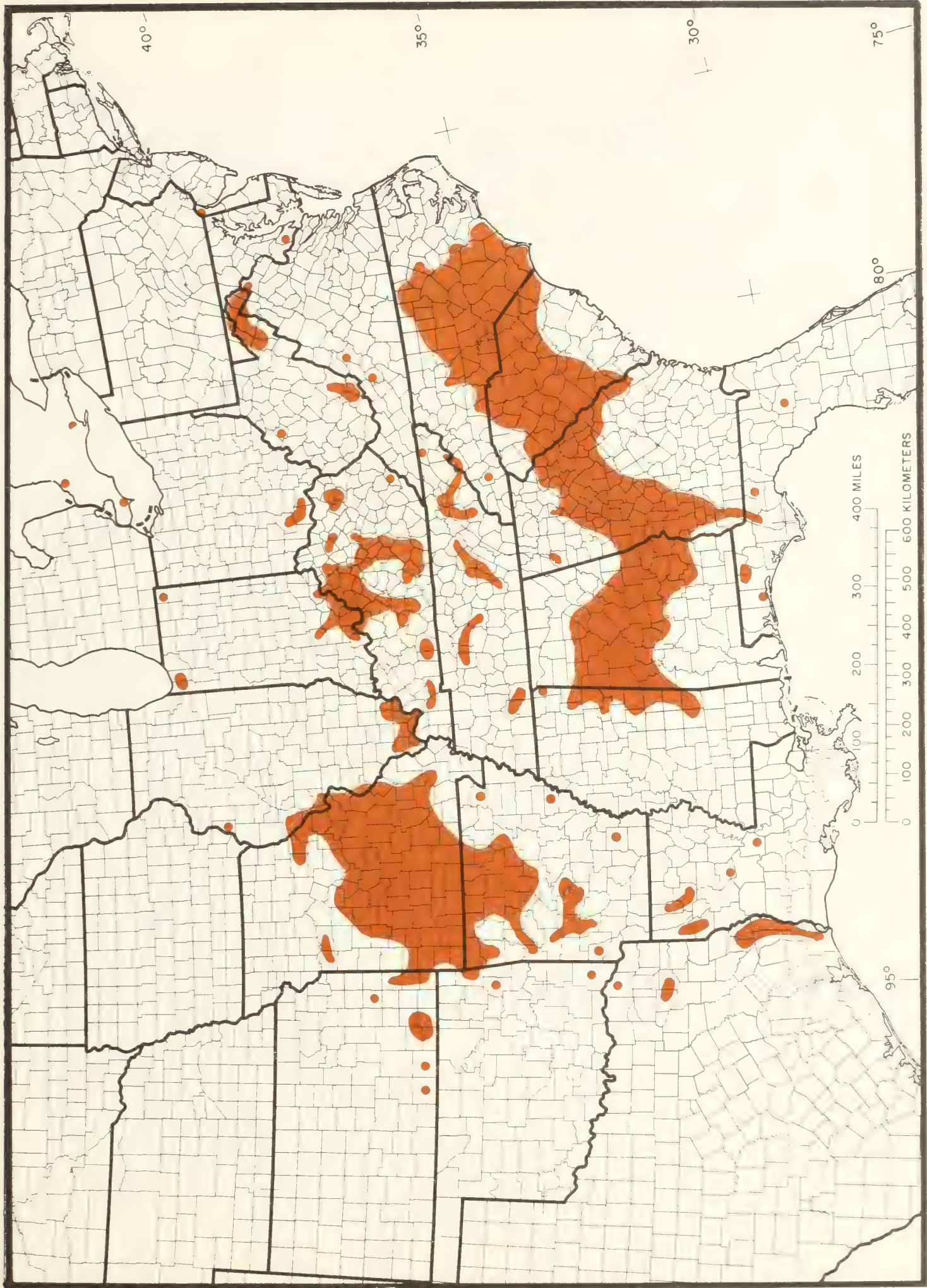
Map 28. *Castanea ozarkensis* Ashe., Ozark chinkapin. Local in Ozark Plateau of s. Mo., Ark. and e. Okla.



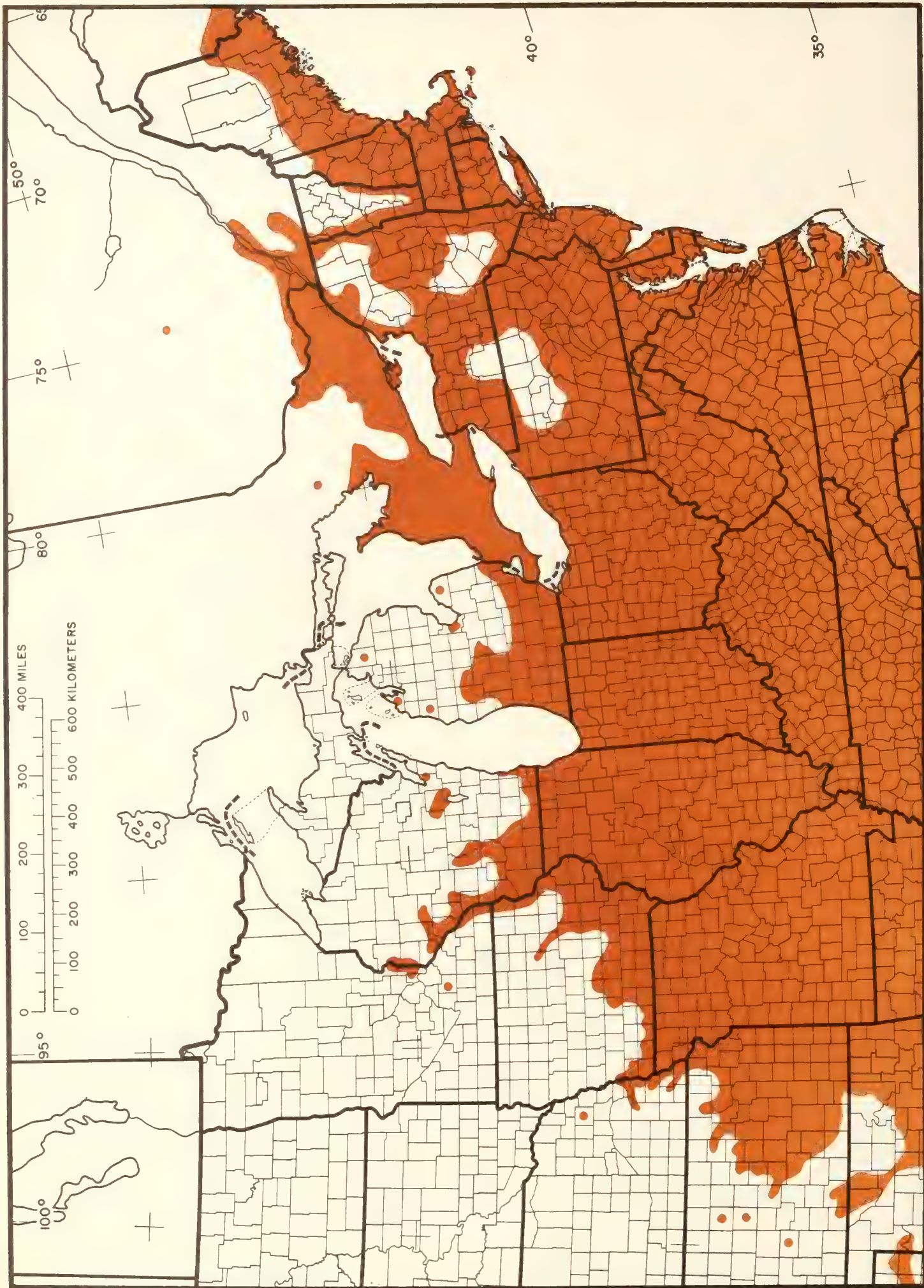
Map 29. *Castanea pumilla* Mill., Allegheny chinkapin.



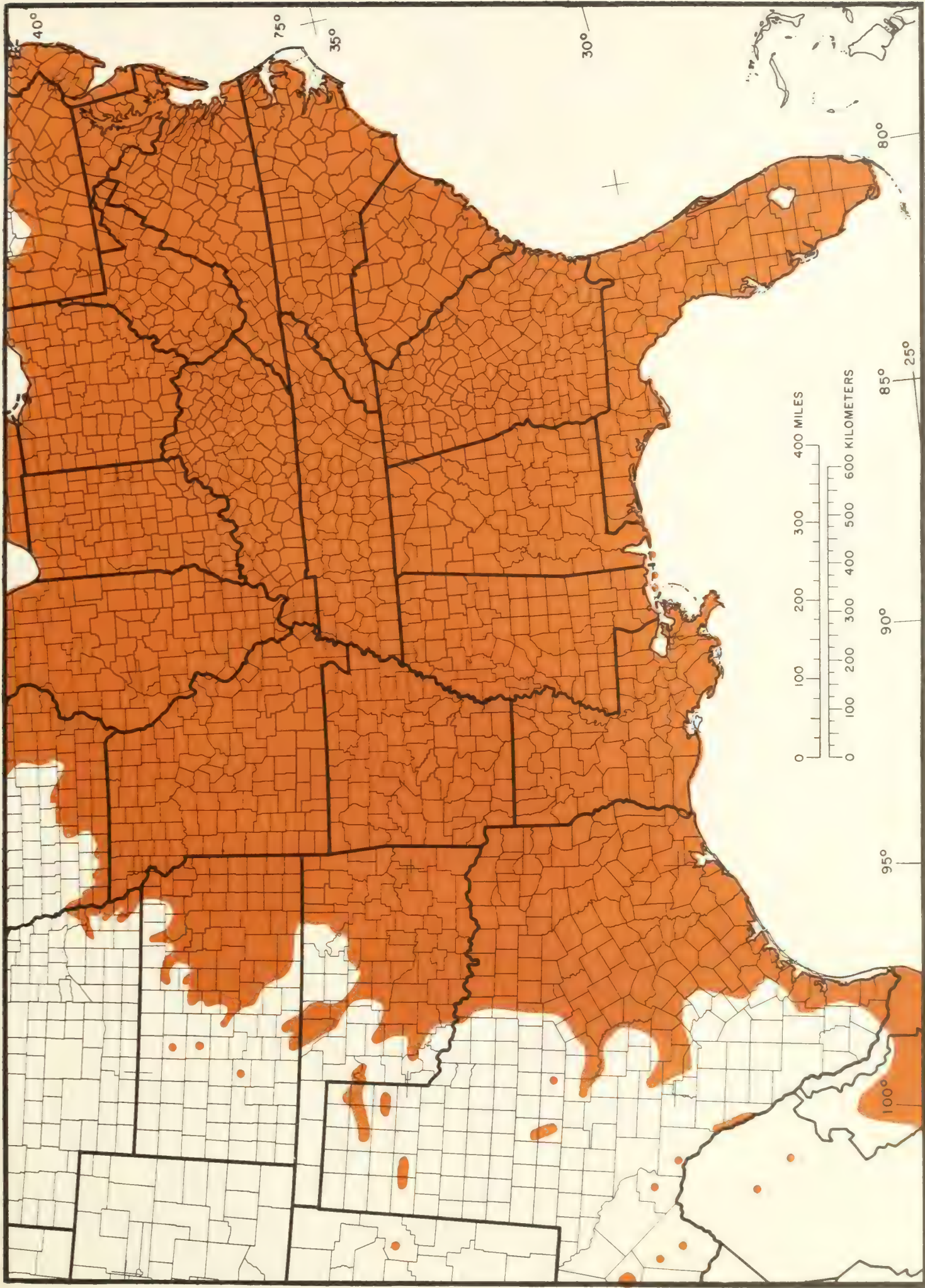
Map 30. *Catalpa bignonioides* Walt., southern catalpa. Native range uncertain. Widely naturalized beyond.



Map 31. *Celtis tenuifolia* Nutt., Georgia hackberry.



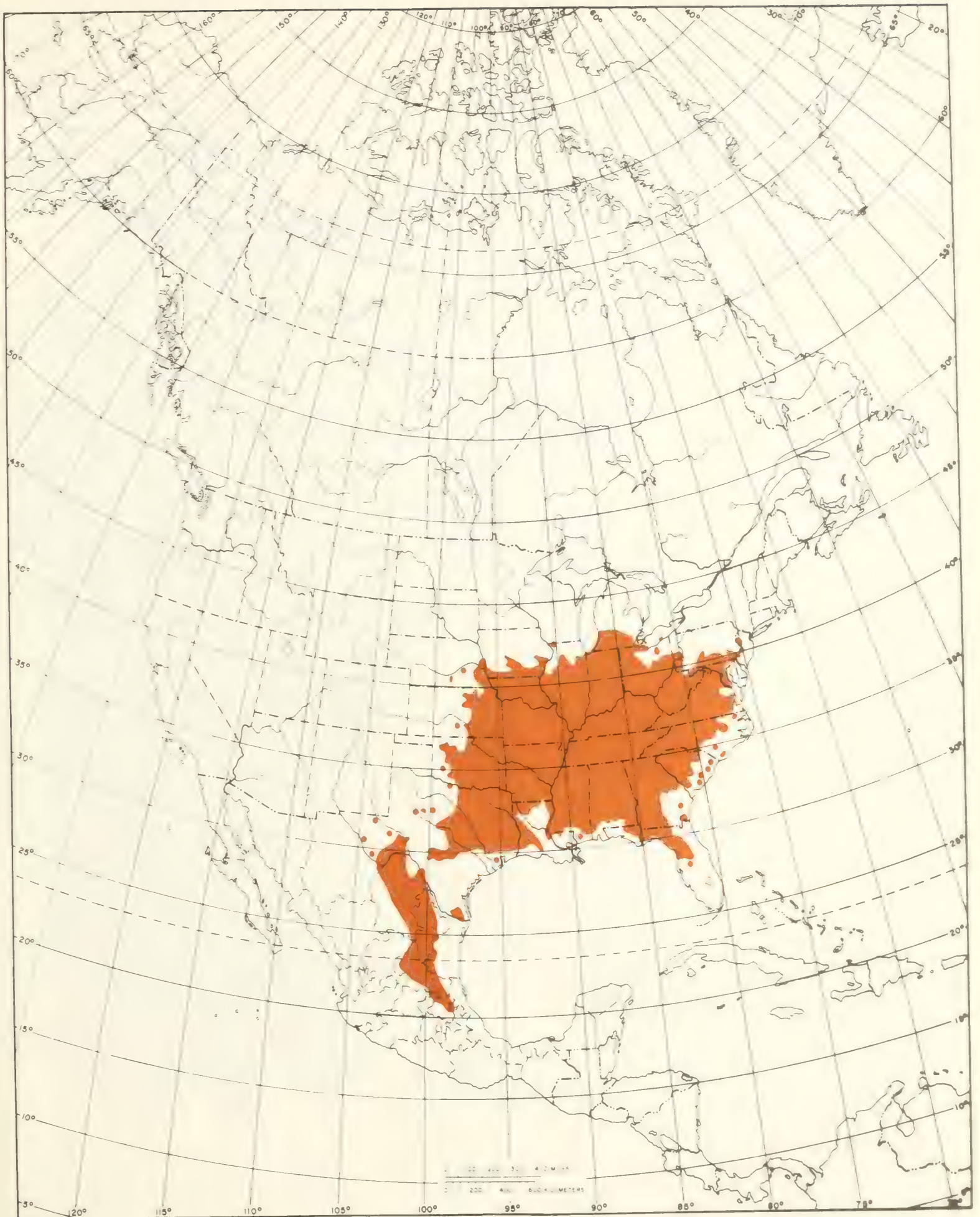
Map 32-NE. *Cephalanthus occidentalis* L., common buttonbush. Western range in Volume 3.



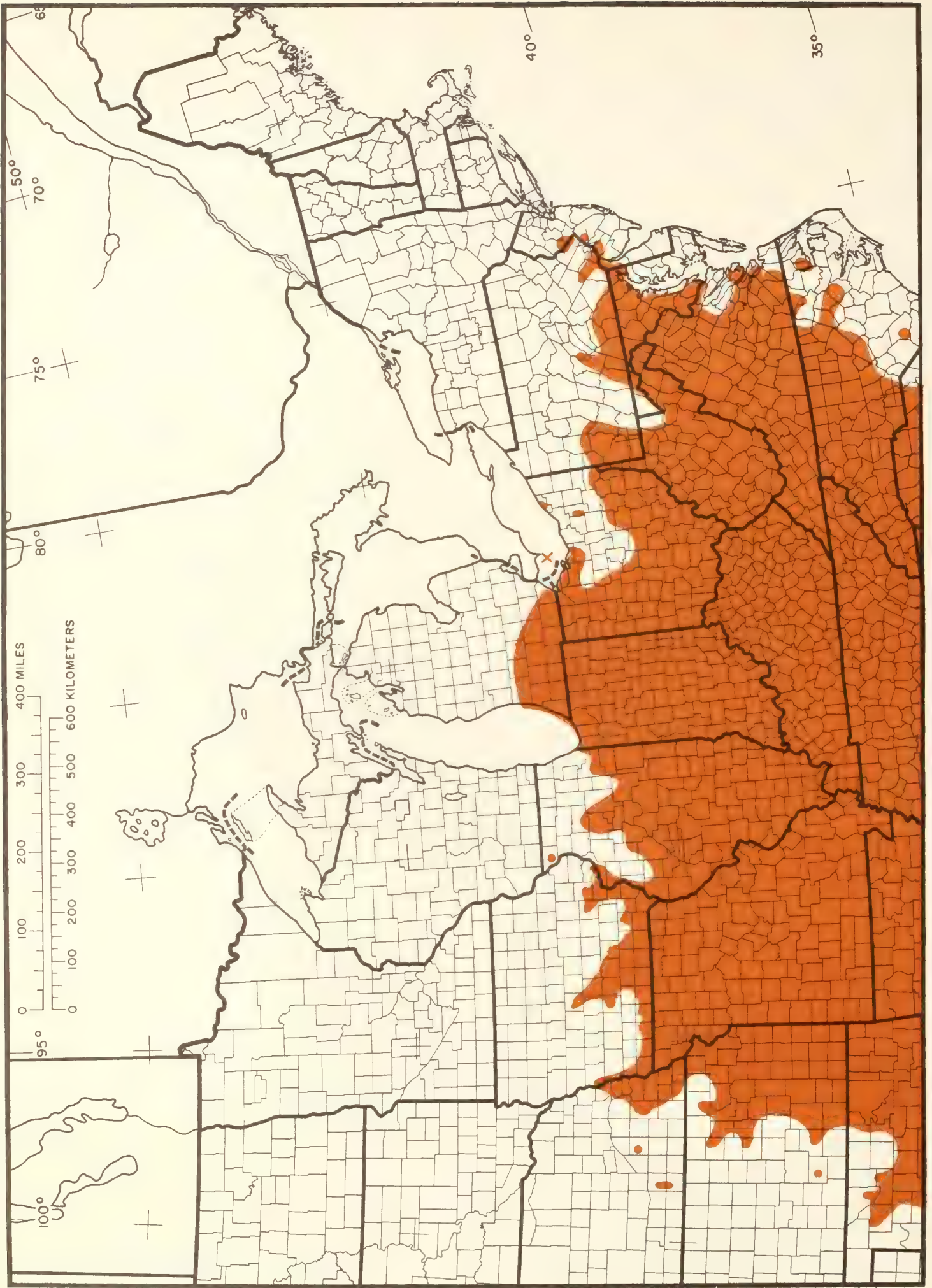
Map 32-SE. *Cephalanthus occidentalis* L., common buttonbush. Western range in Volume 3.



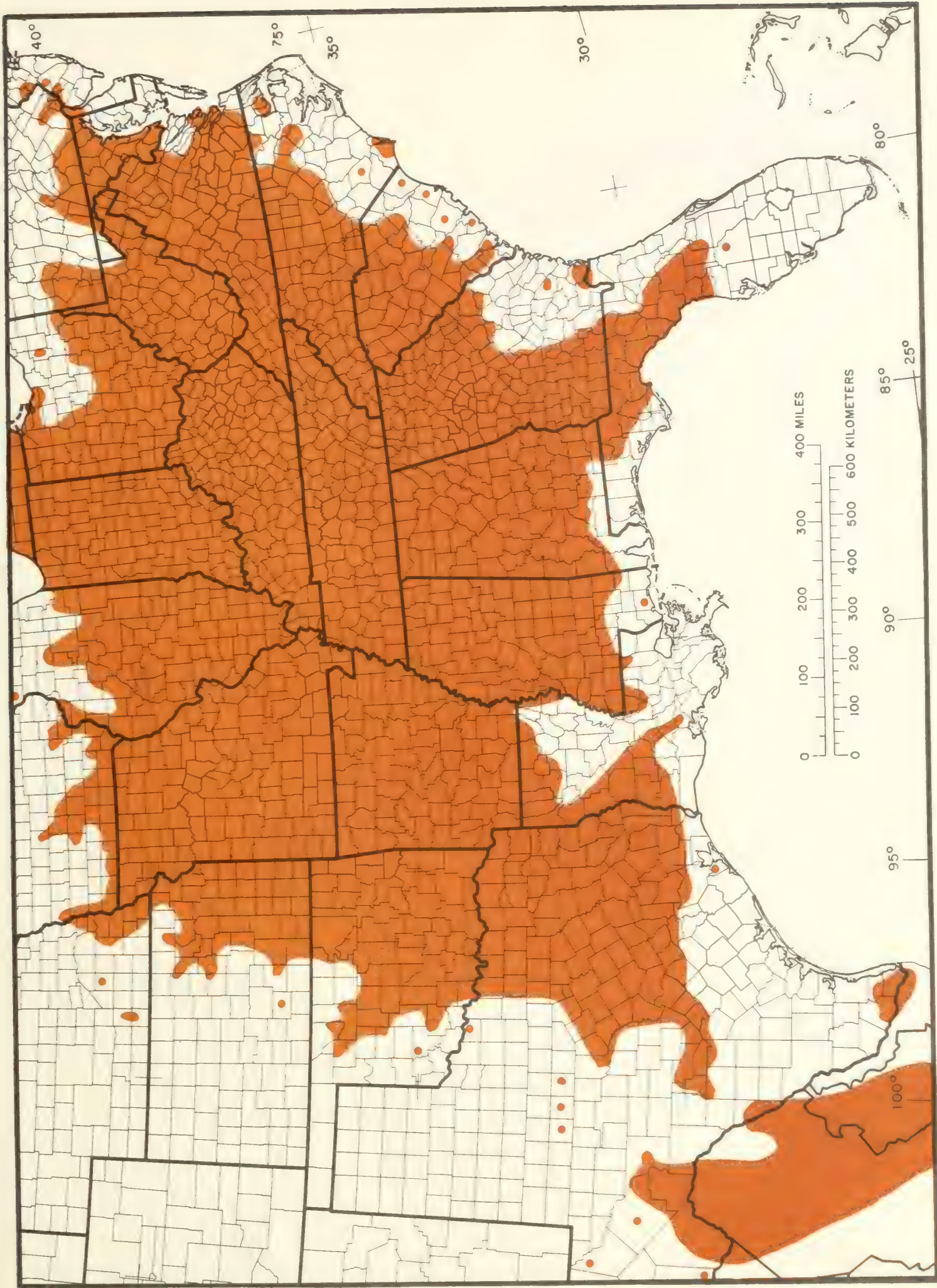
Map 32-N. *Cephalanthus occidentalis* L., common buttonbush. The same or a closely related species also in e. Asia.



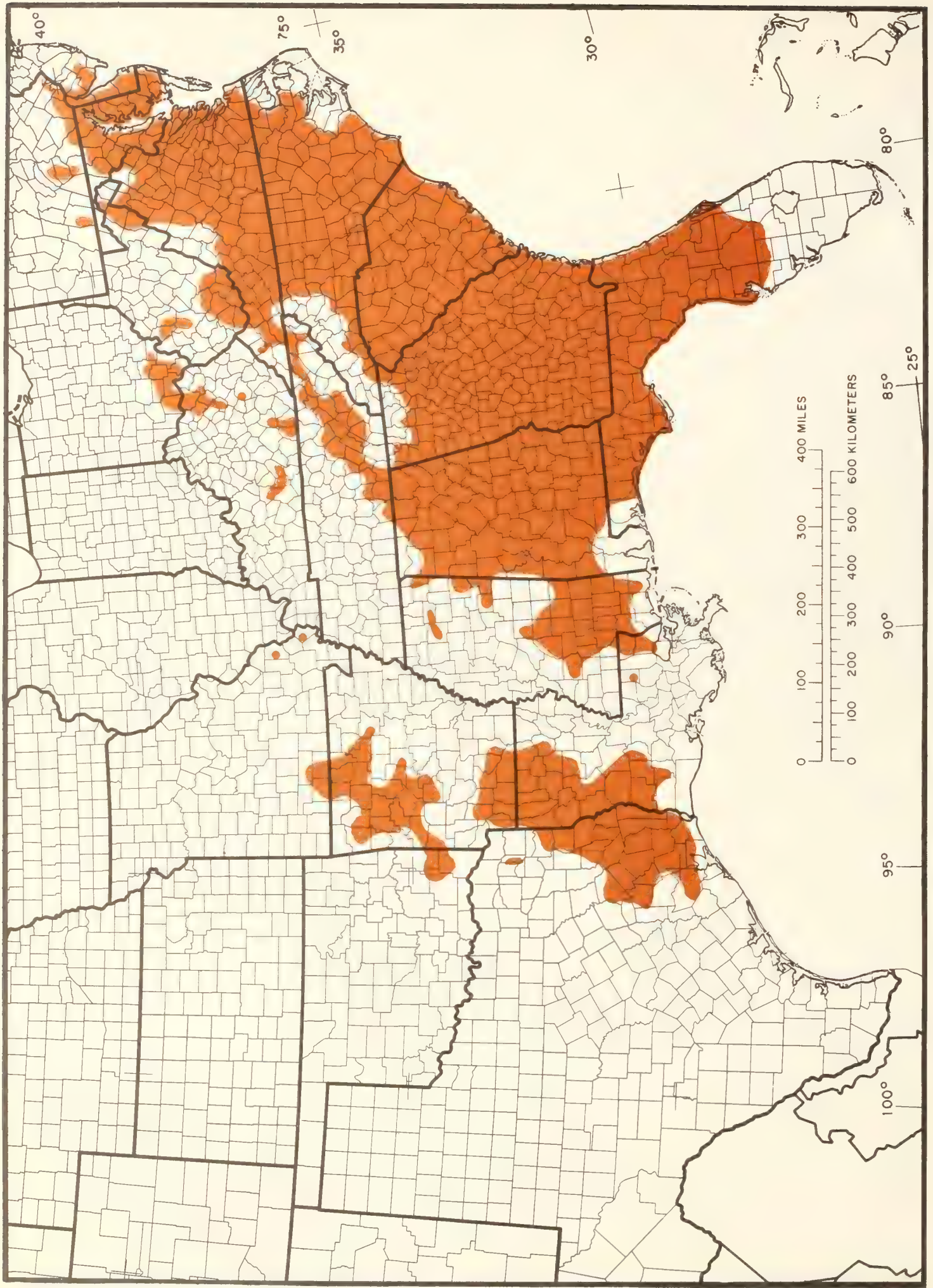
Map 33-N. *Cercis canadensis* L., eastern redbud.



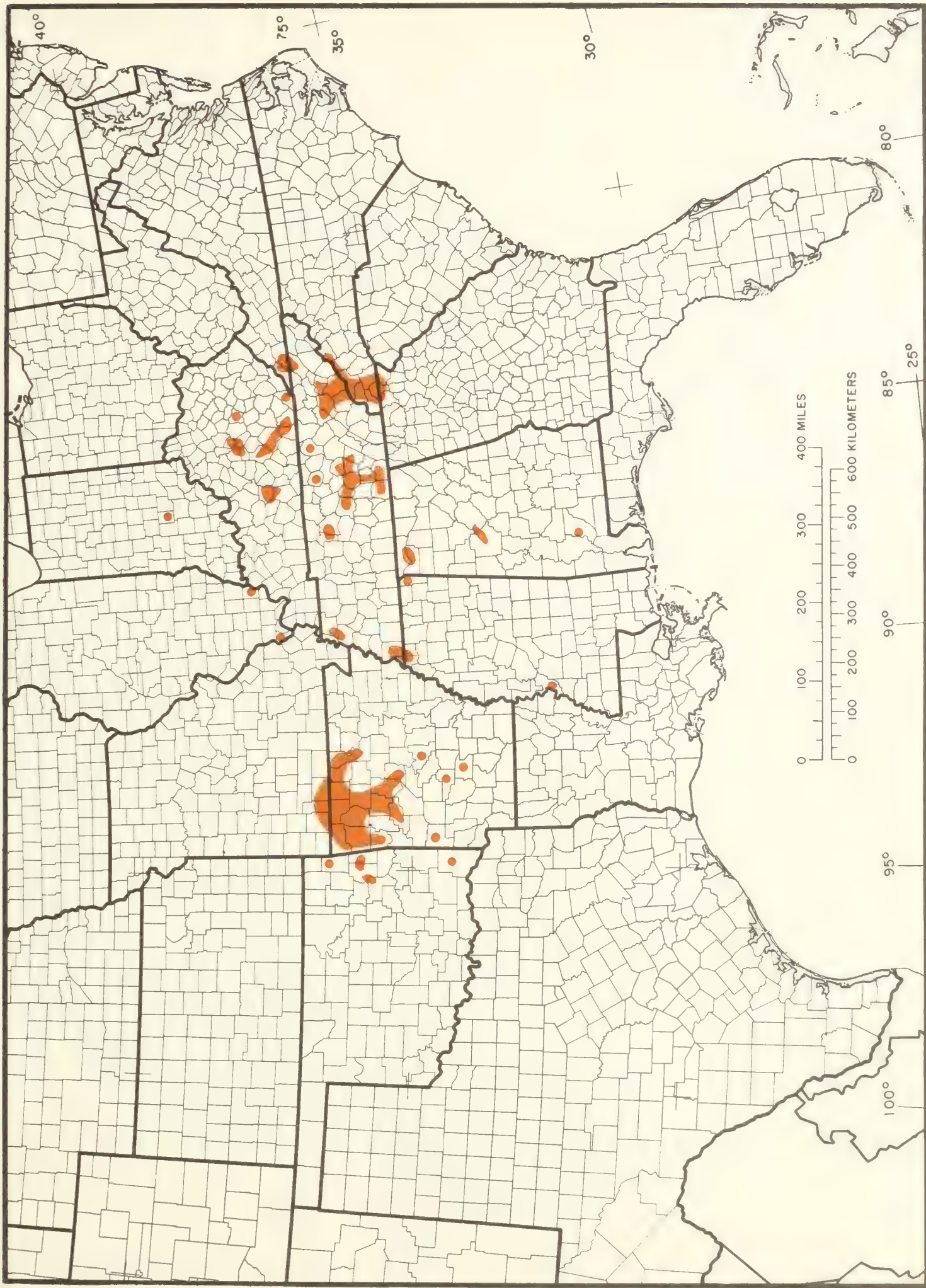
Map 33-NE. *Cercis canadensis* L., eastern redbud. Western range in Volume 3.



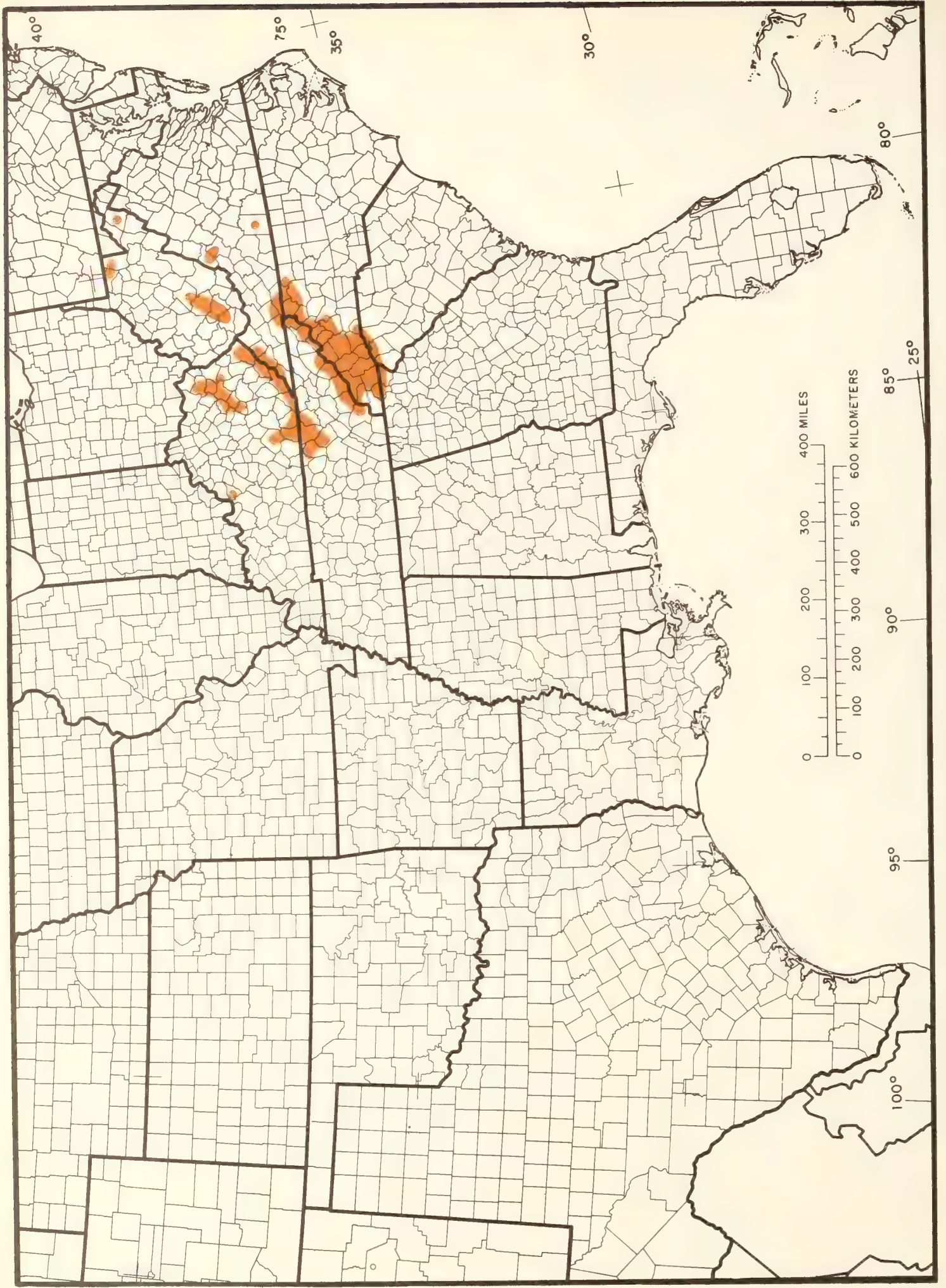
Map 334. *Cereus canadensis* L., eastern redbud. Western range in Volume 3.



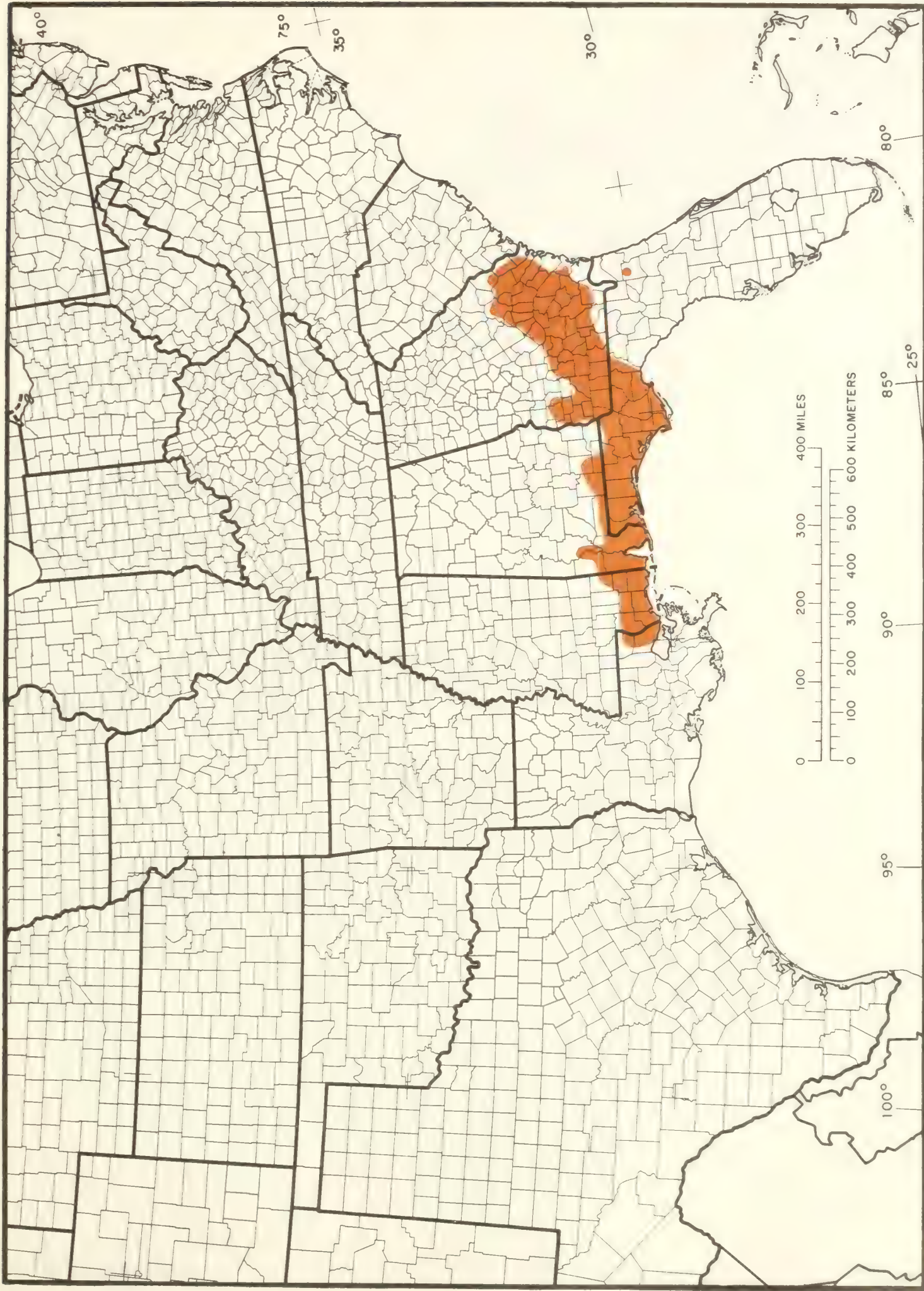
Map 34. *Chionanthus virginicus* L., fringetree.



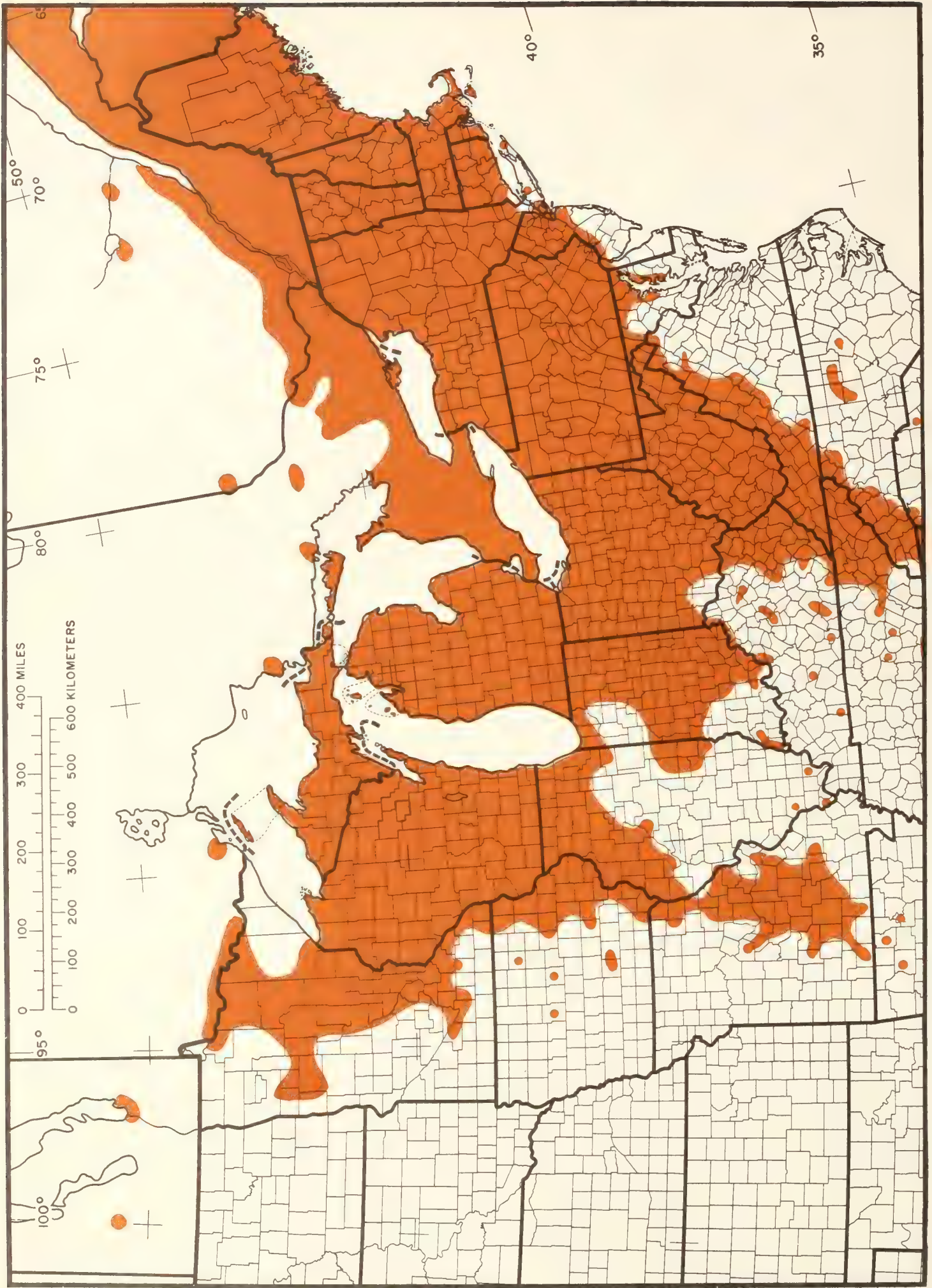
Map 35. *Cladrastis kentukea* (Dum.-Cours.) Rudd, yellowwood.



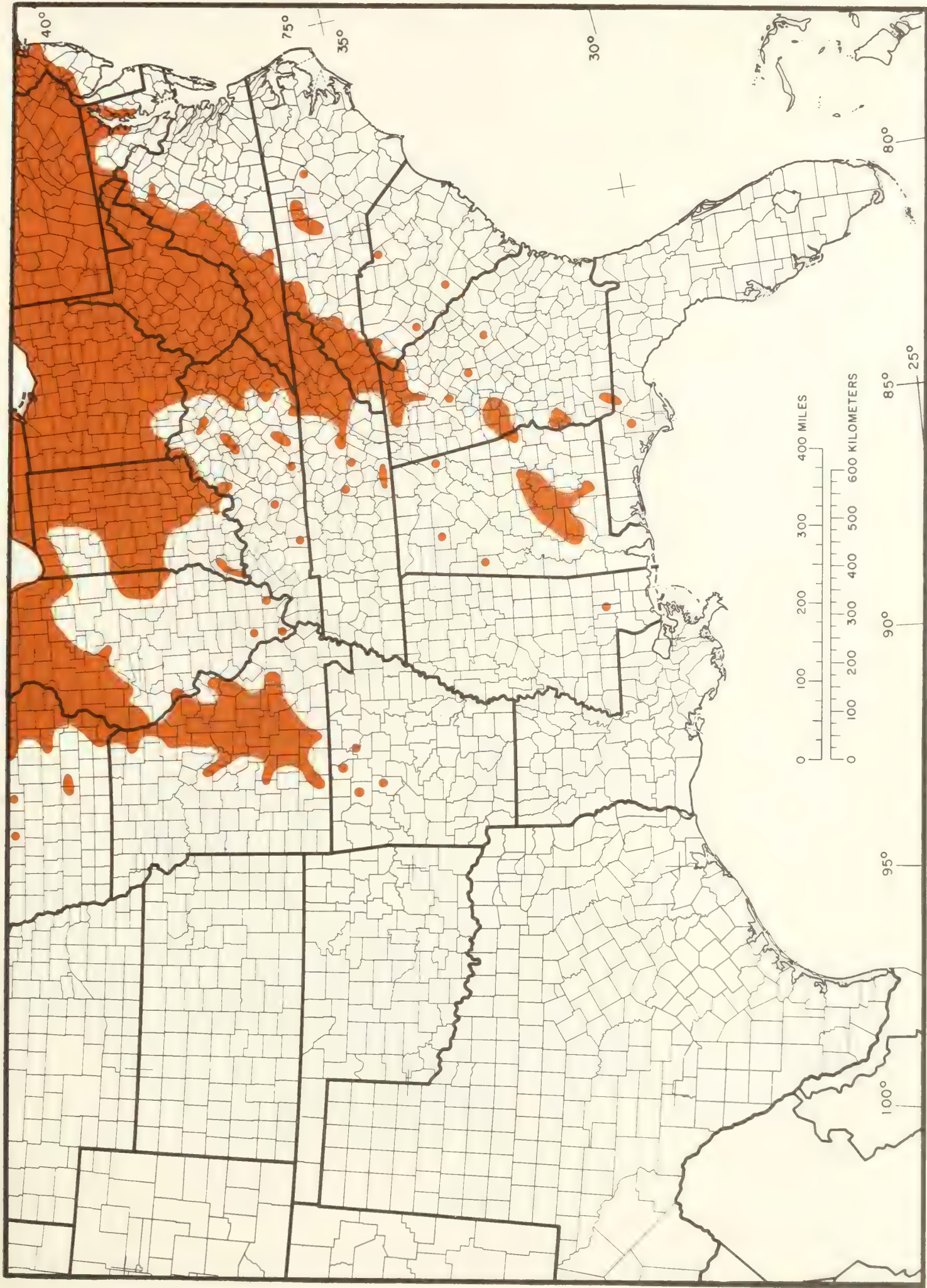
Map 36. *Clethra acuminata* Michx. cinnamom. clethra.



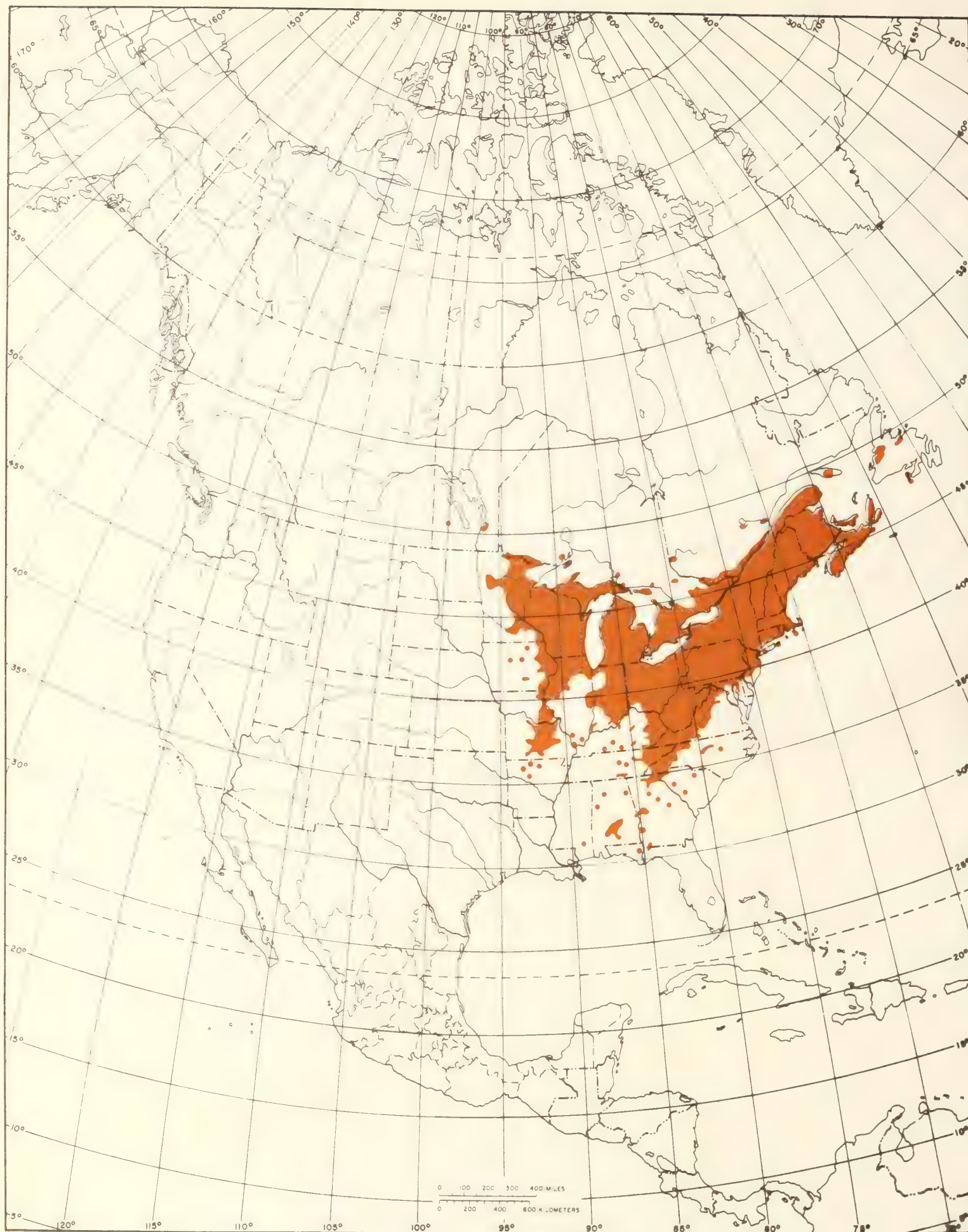
Map 37. *Cliftonia monophylla* (Lam.) Britton, buckwheat-tree.



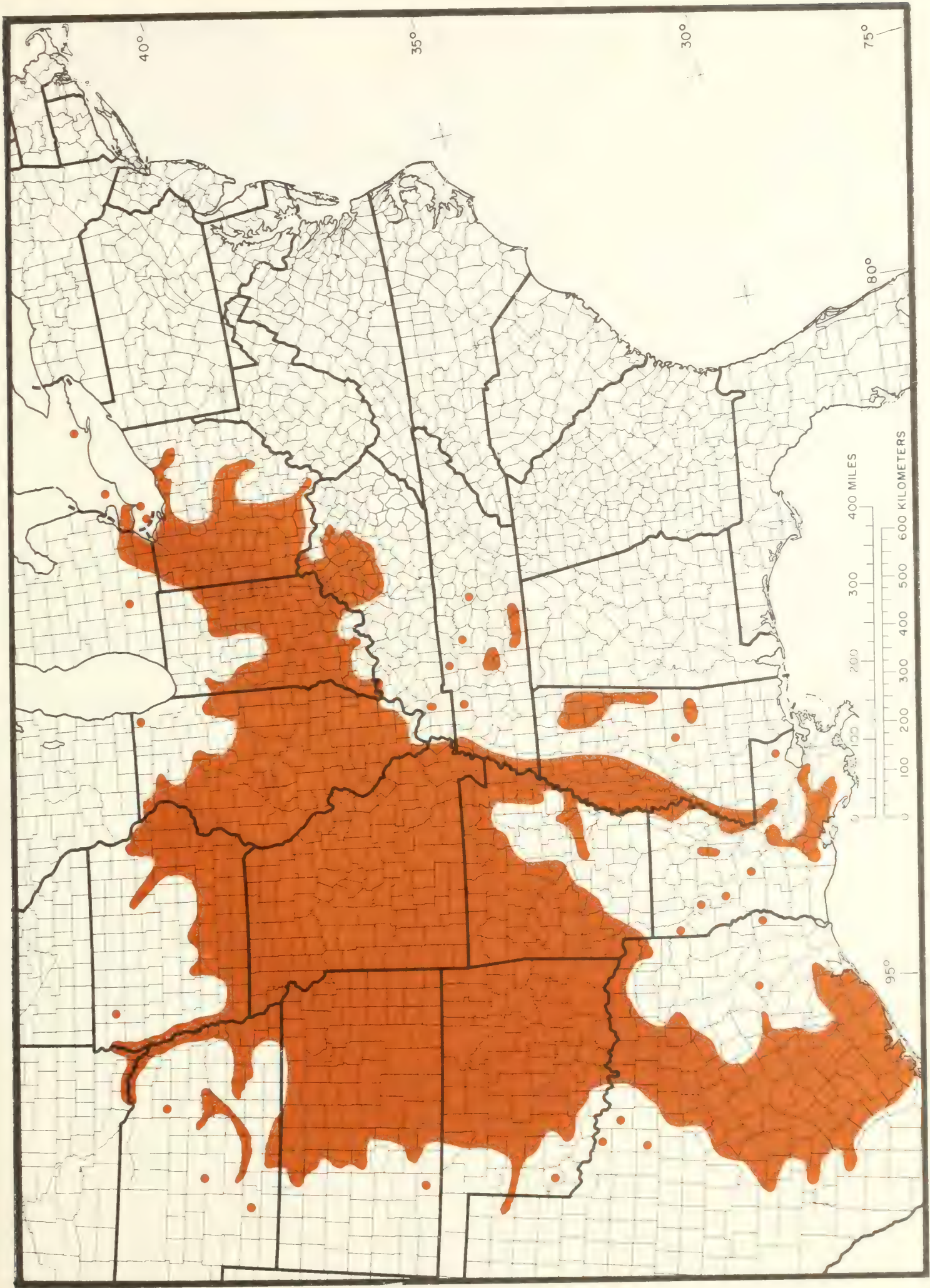
Map 38-NF. *Cornus alternifolia* L. f. alternate-leaf dogwood.



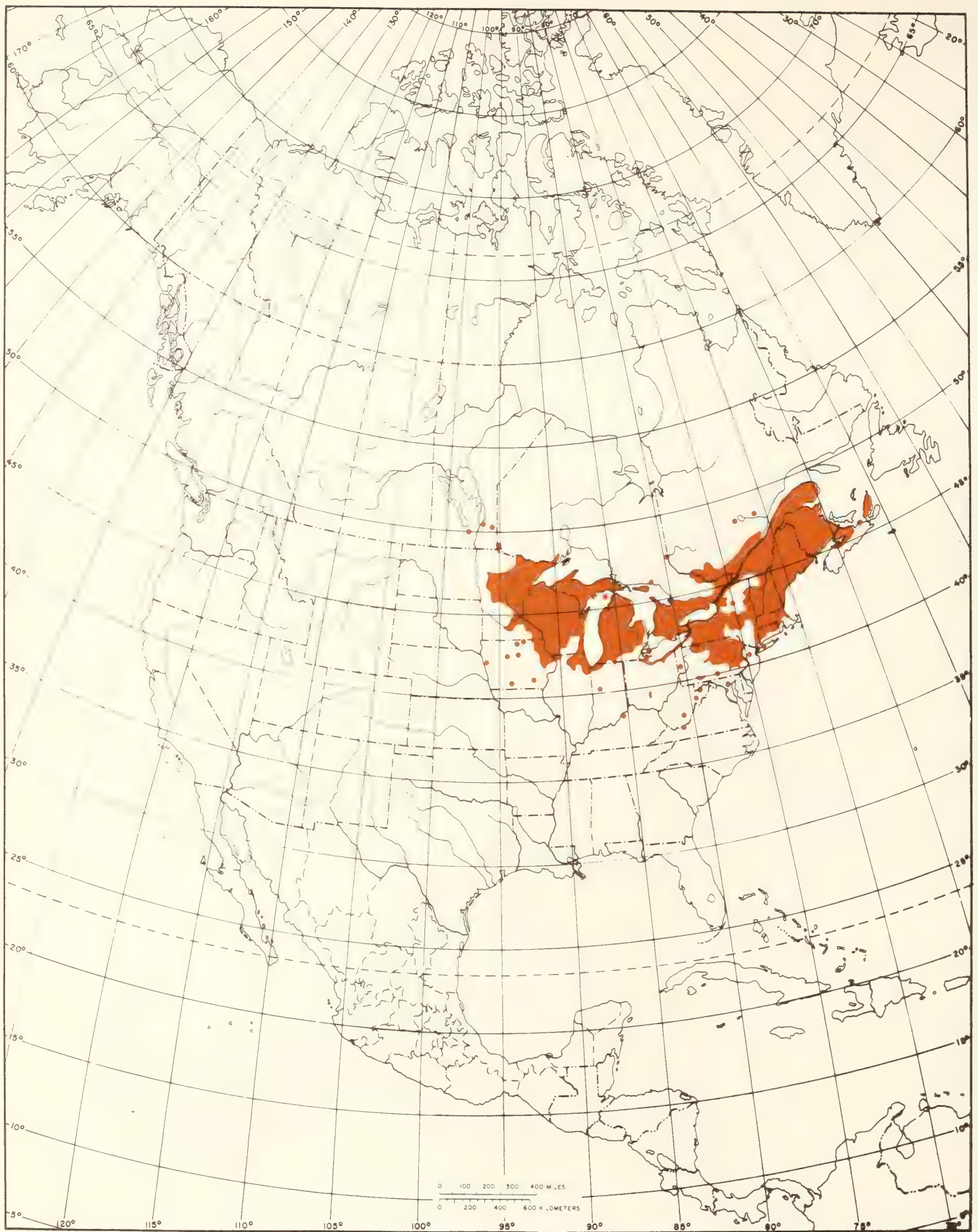
Map 38-SE. *Cornus alternifolia* L.f. alternate-leaf dogwood.



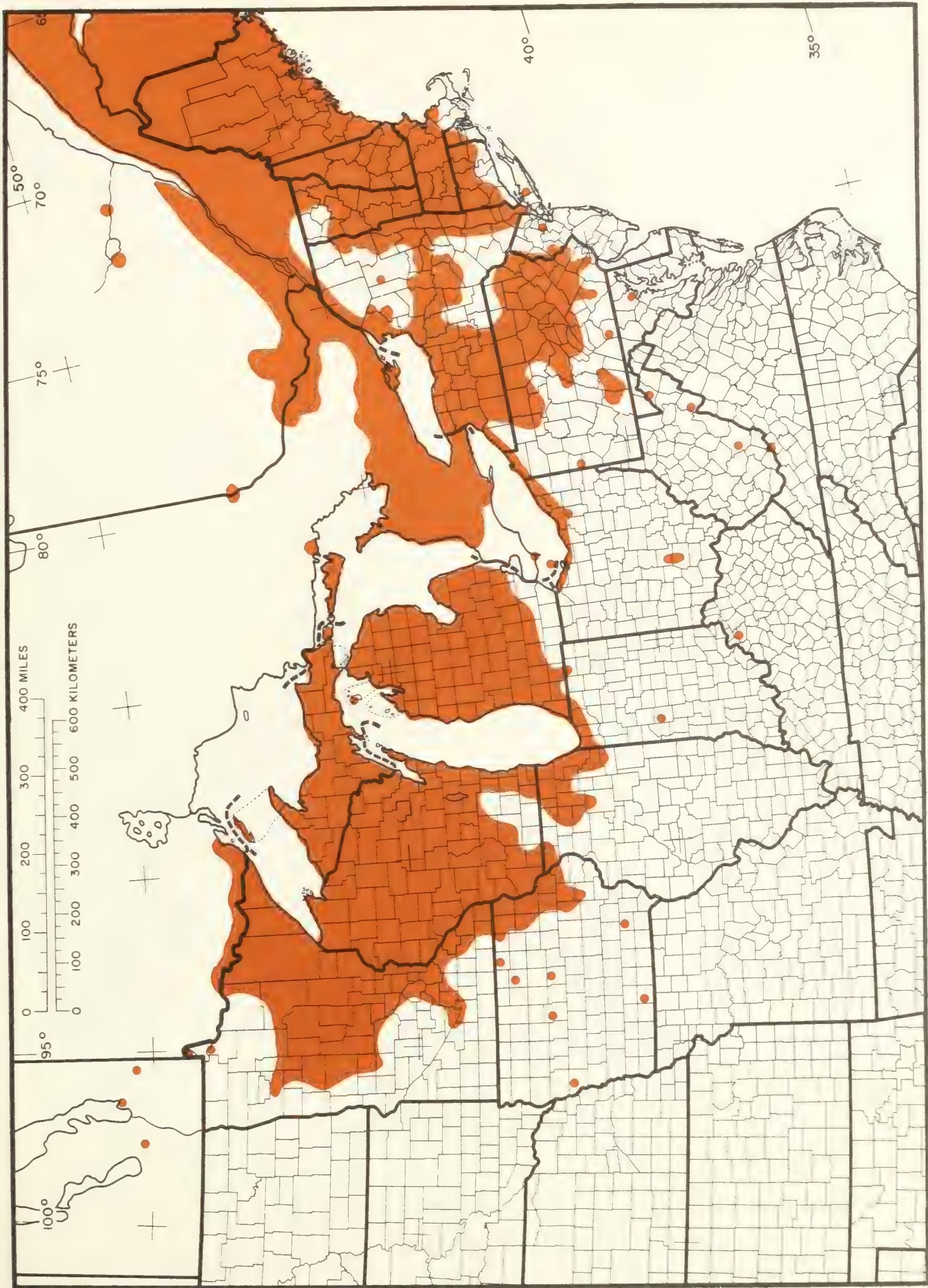
Map 38-N. *Cornus alternifolia* L. f. alternate-leaf dogwood.



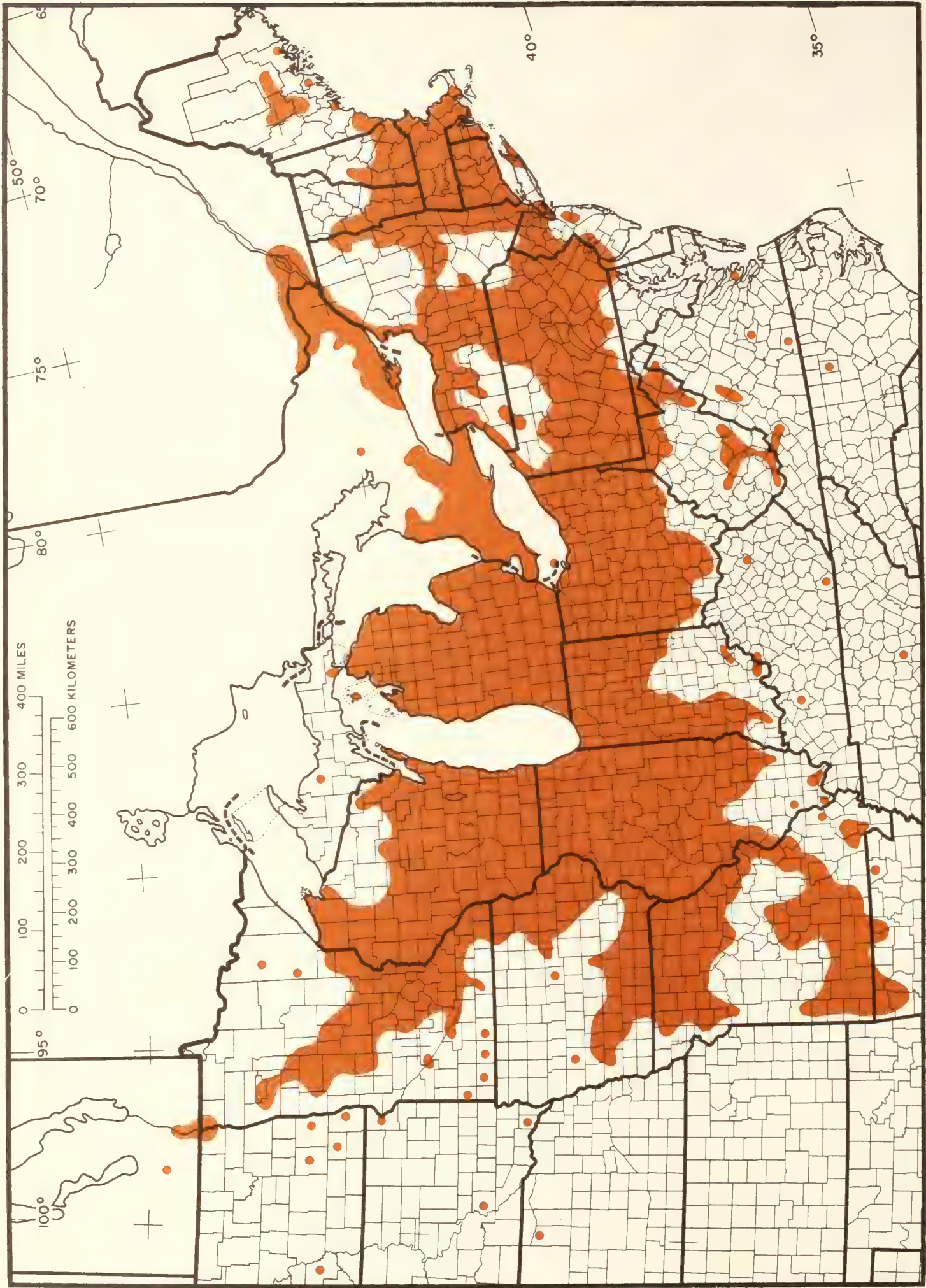
Map 39. *Cornus drummondii* C. A. Meyer, roughleaf dogwood.



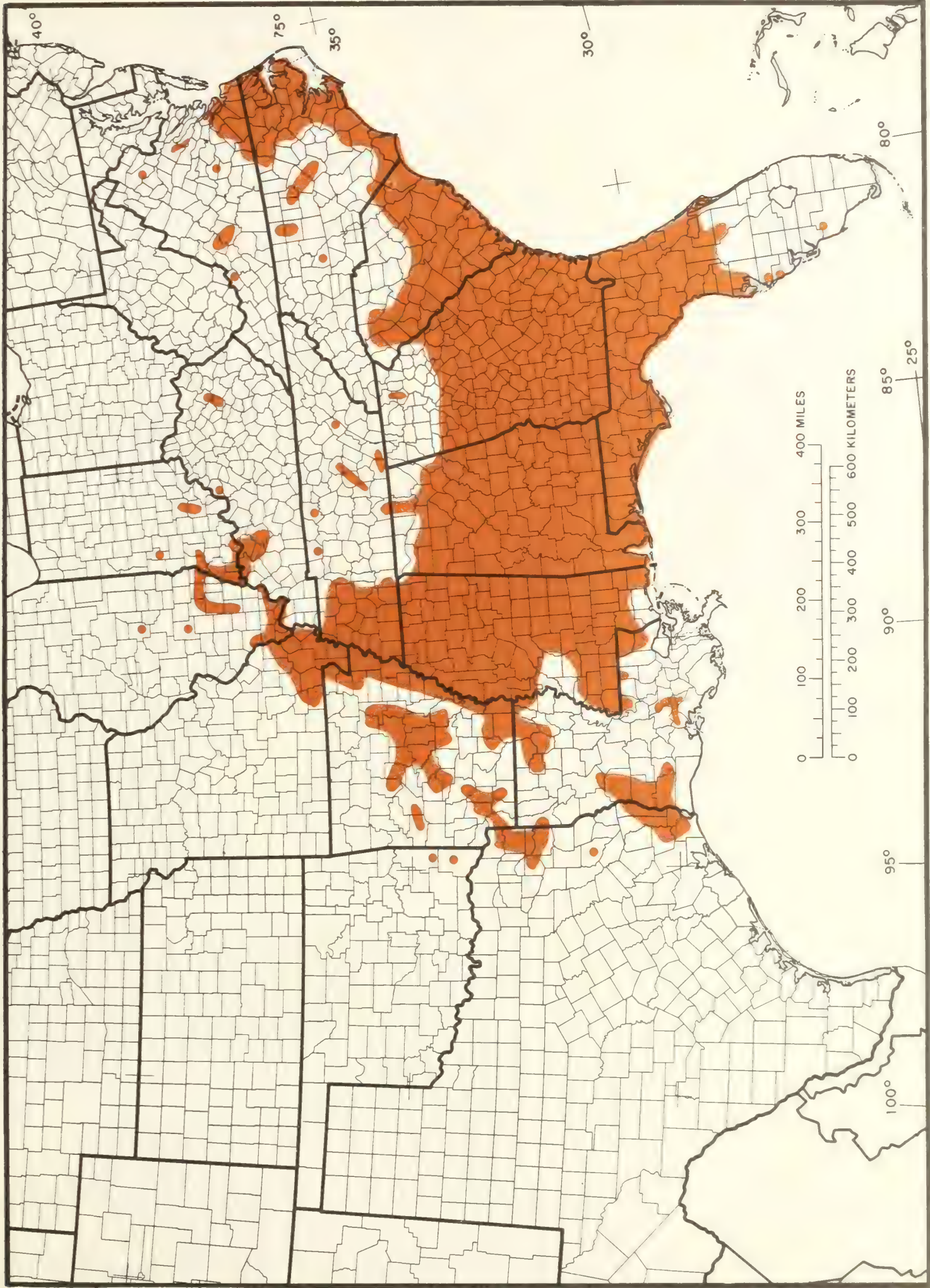
Map 40-N. *Cornus rugosa* Lam., roundleaf dogwood.



Map 10. N.E. *Cornus rugosa* Lam., roundleaf dogwood



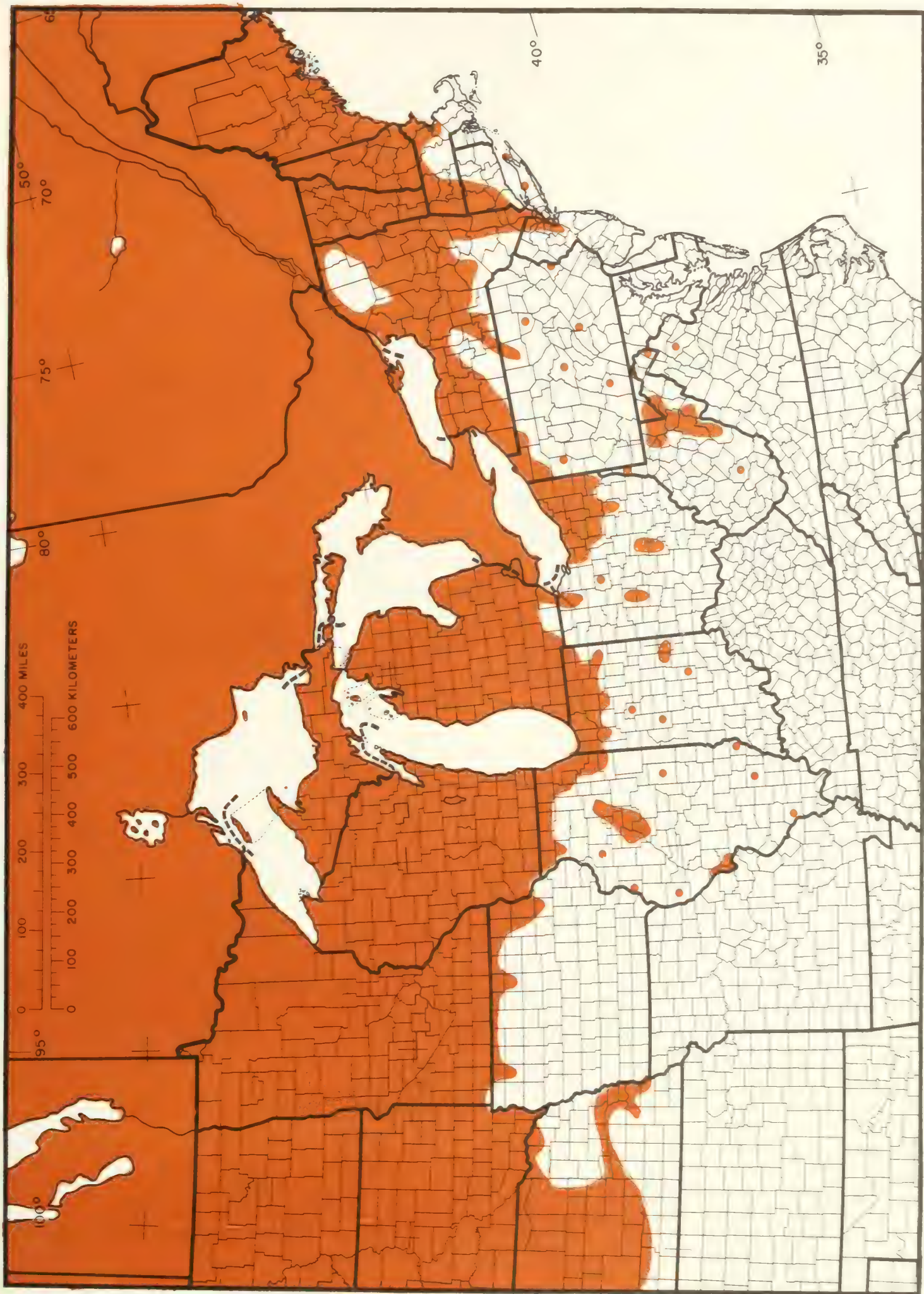
Map 41. *Cornus racemosa* Lam., gray dogwood.



Map 12. *Cornus stricta* Lam., stiffcornel dogwood.



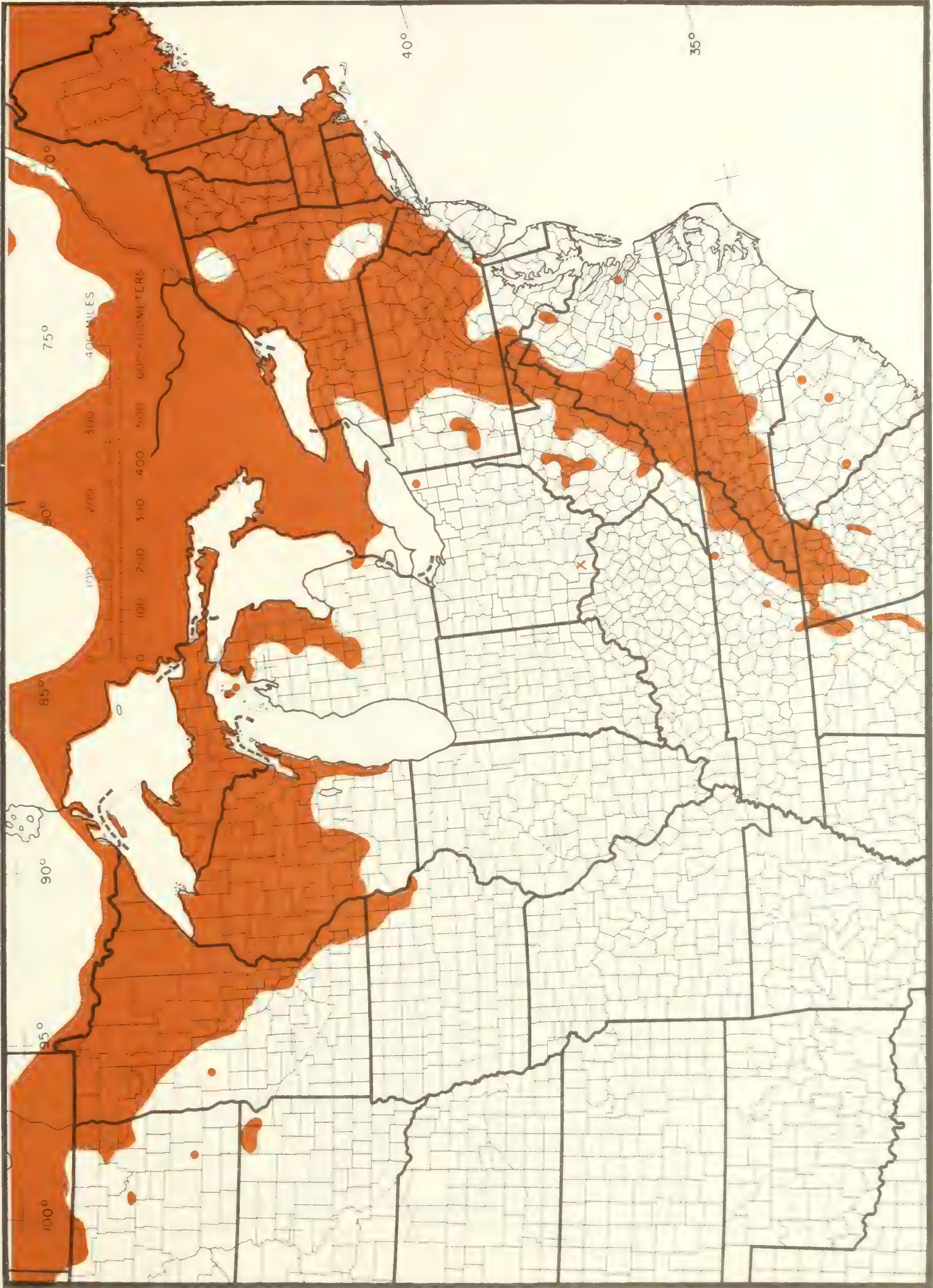
Map 13-N. *Cornus stolonifera* Michx., red-osier dogwood.



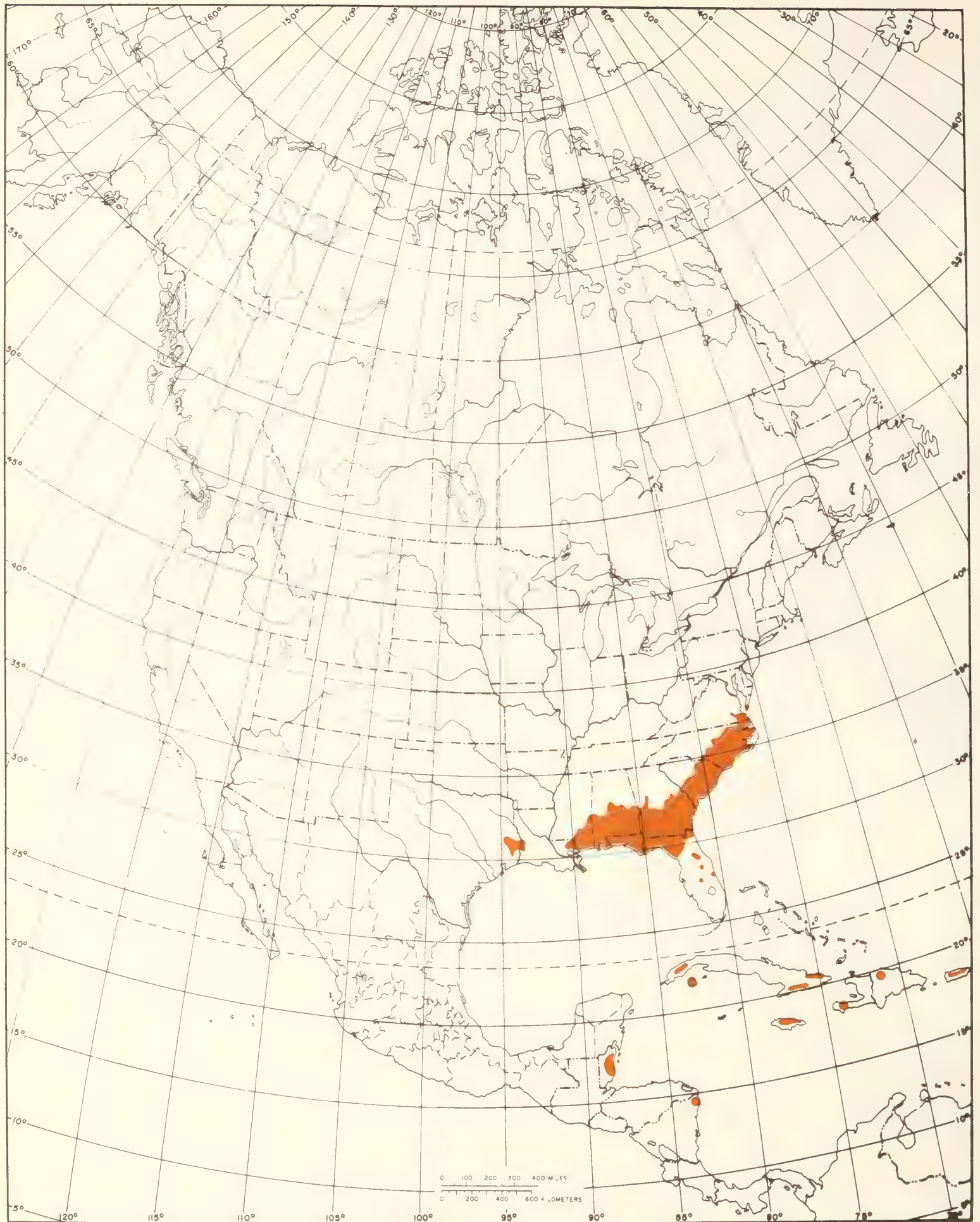
Map 13. N.E. *Cornus stolonifera* Michx., red-osier dogwood. Western range in Volume 3.



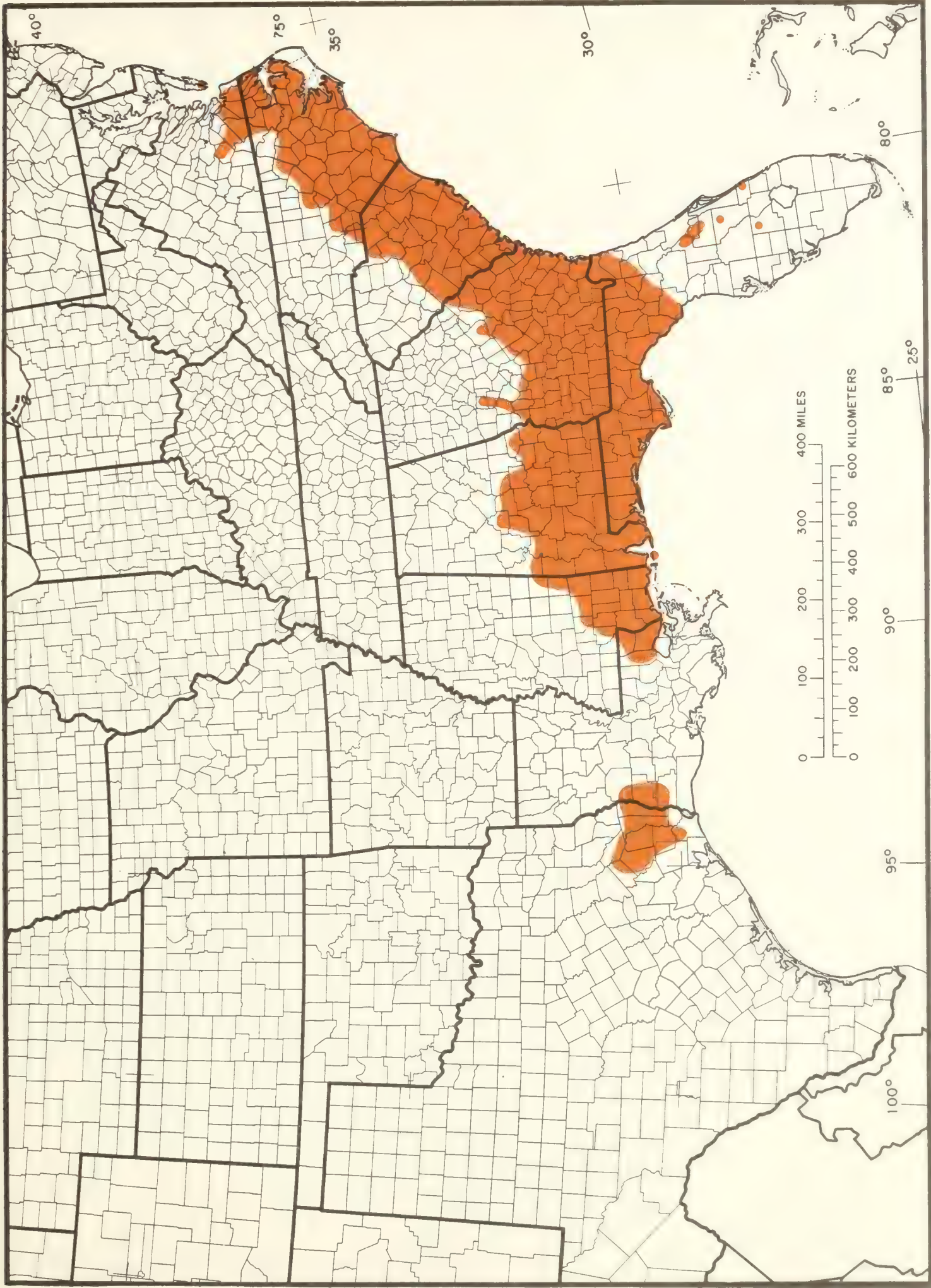
Map 44-N. *Corylus cornuta* Marsh., beaked hazel.



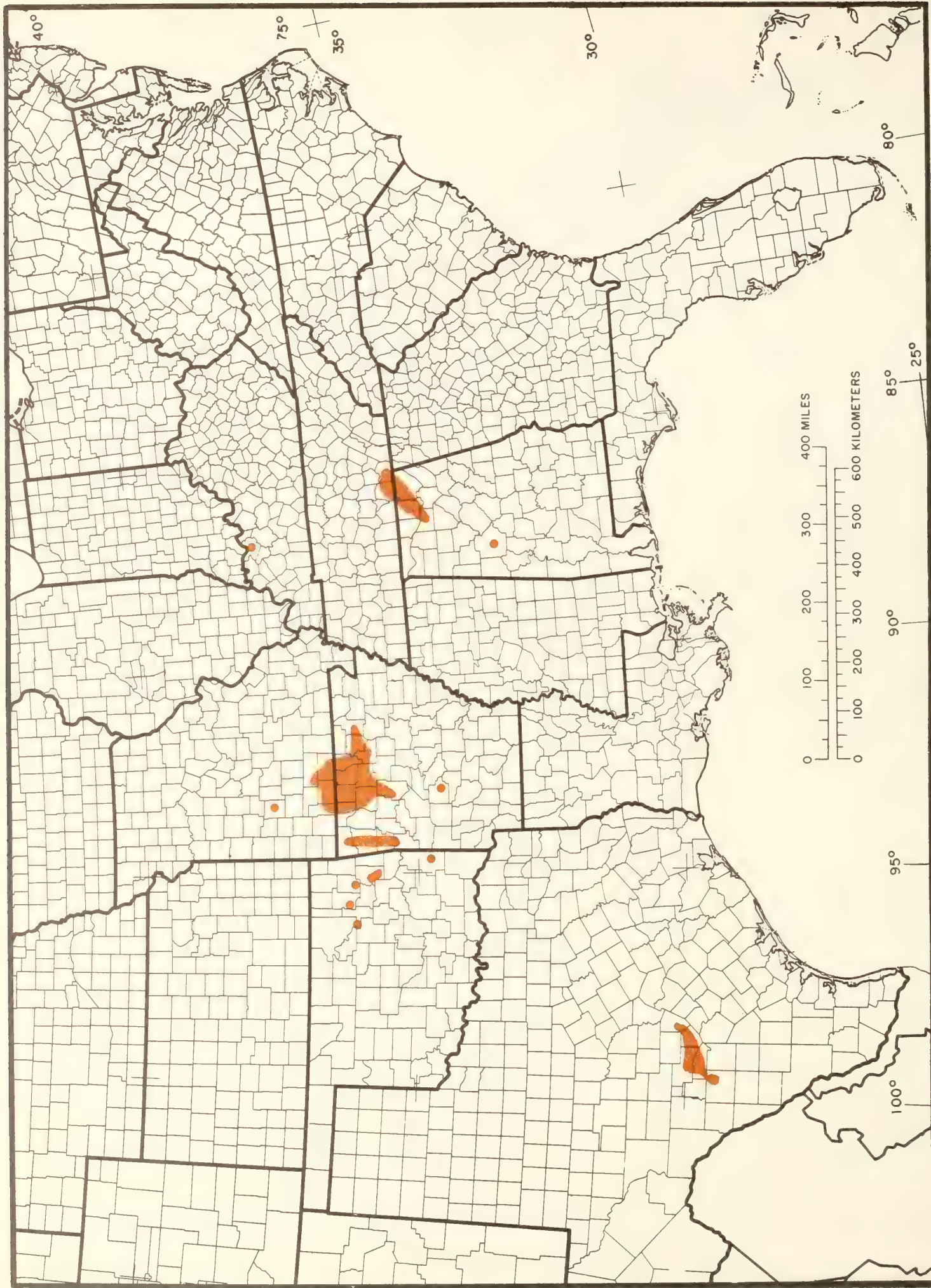
Map 44-NE. *Corylus cornuta* Marsh., beaked hazel. Western range in Volume 3.



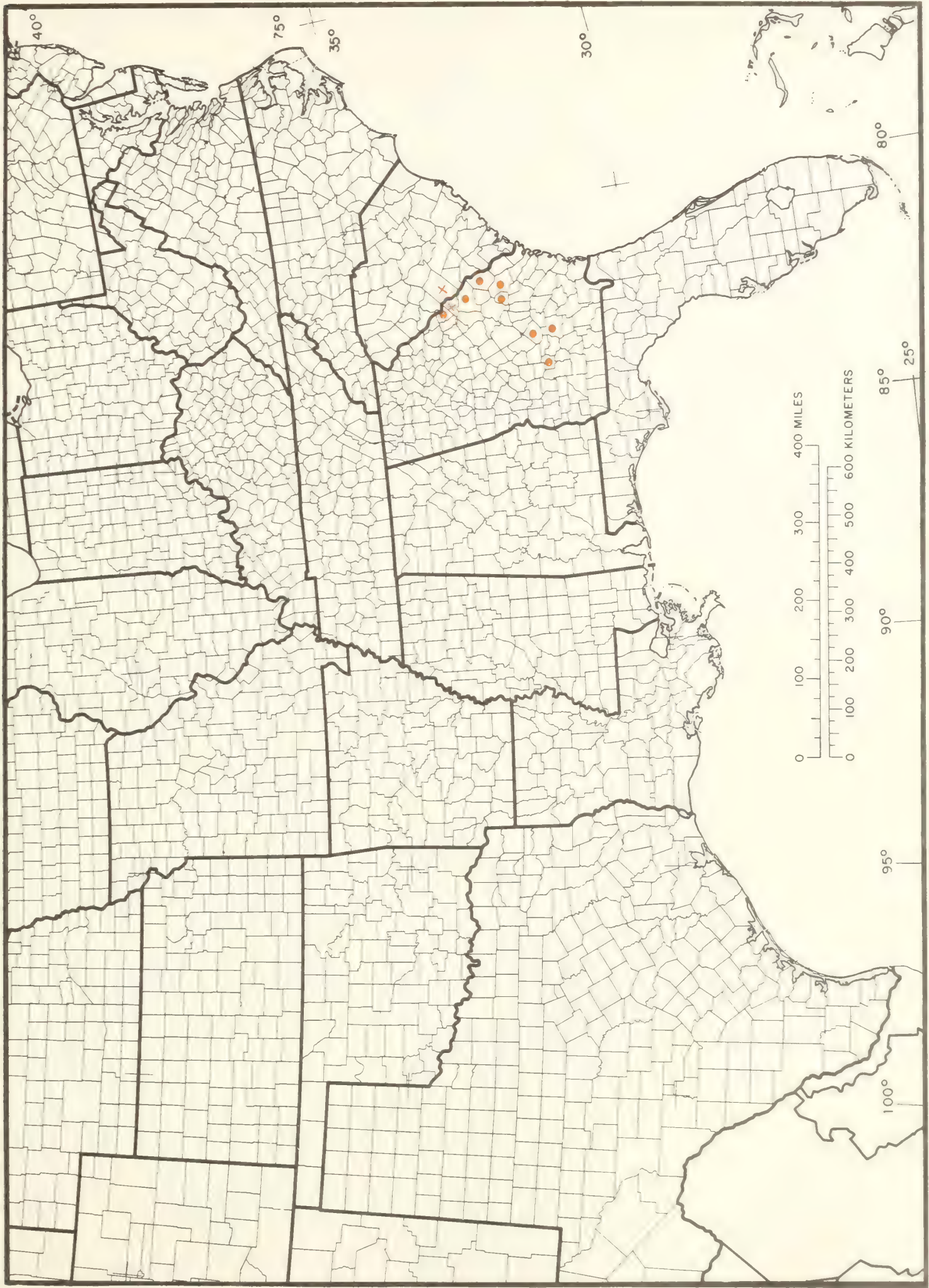
Map 45-N. *Cyrilla racemiflora* L., swamp cyrilla.



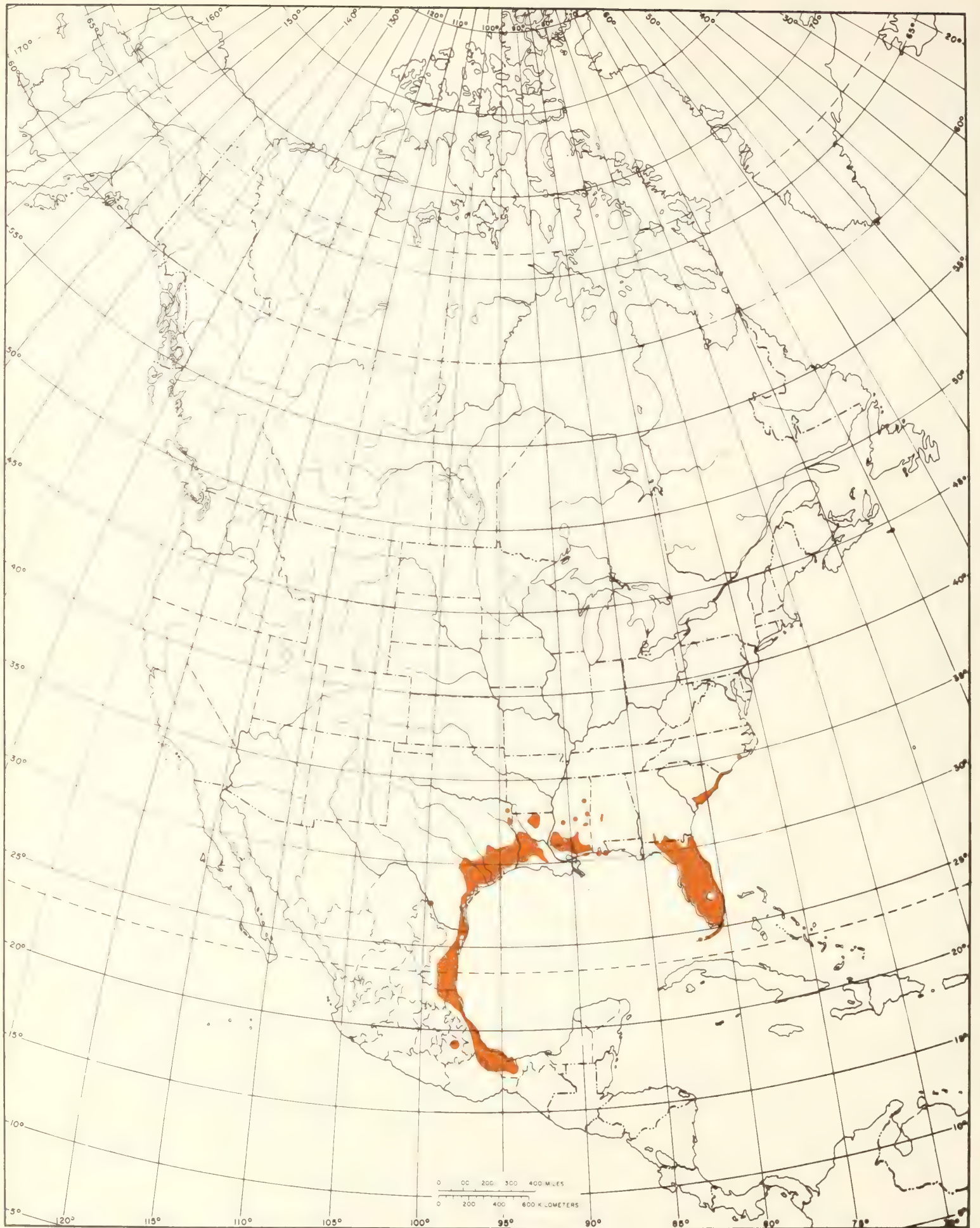
Map 45-SE. *Cyrilla racemiflora* L., swamp cyrilla.



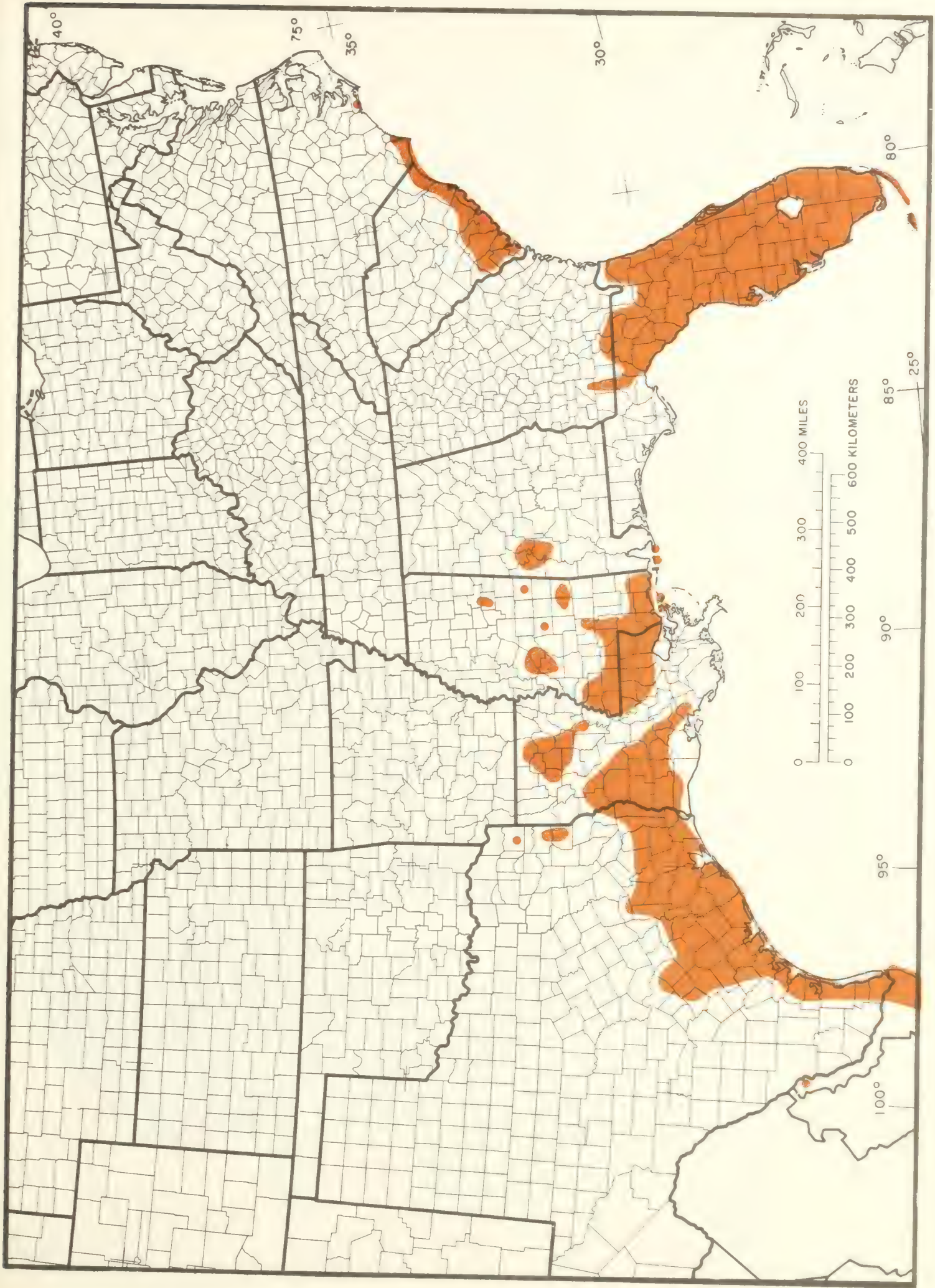
Map 46. *Cotinus obovatus* Raf., American smoketree.



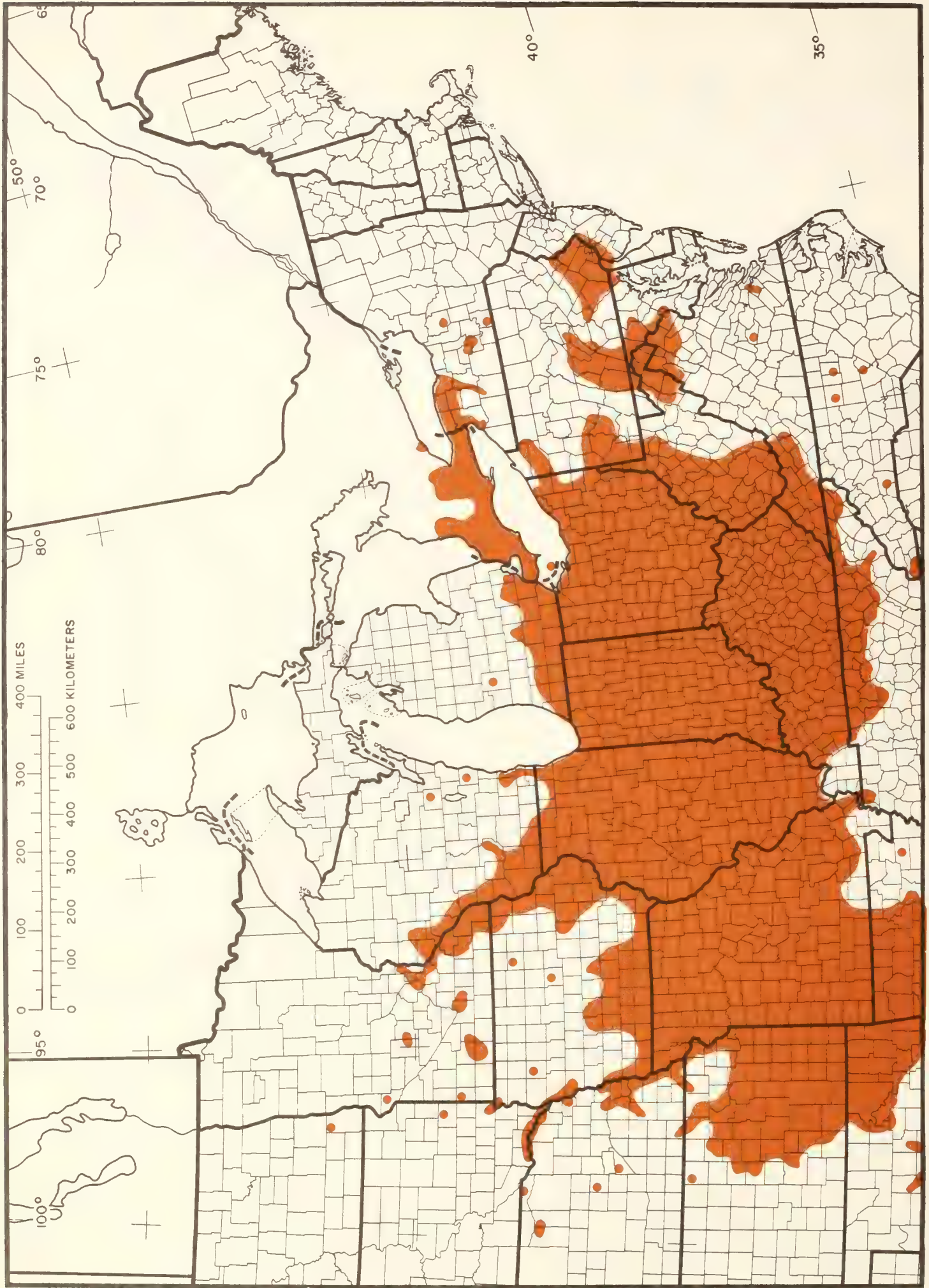
Map 17. *Elliottia racemosa* Miuhl., *elliottii*. Very rare and local in e. and so. Ga., formerly also S. C.



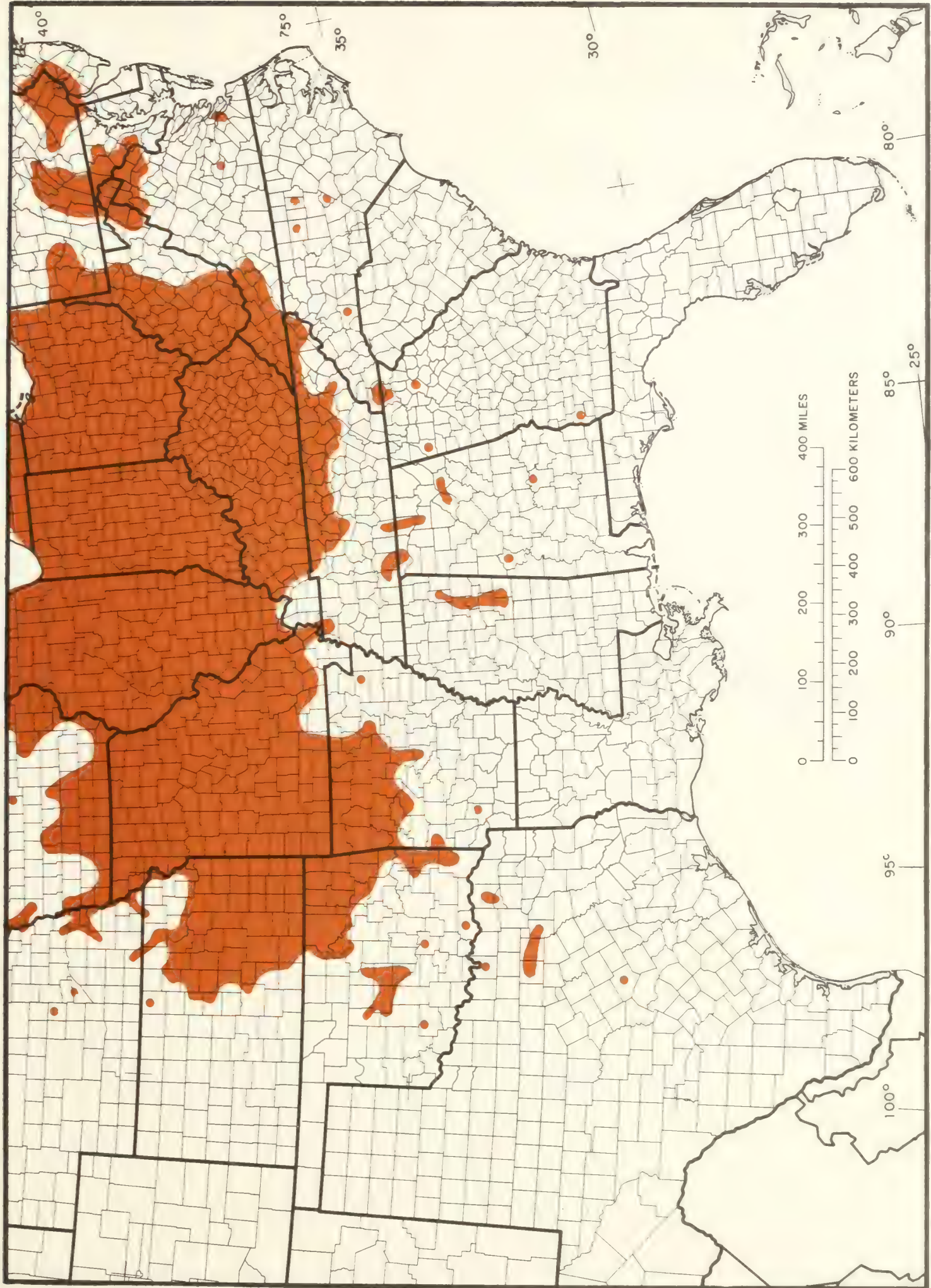
Map 48-N. *Erythrina herbacea* L., eastern coralbean.



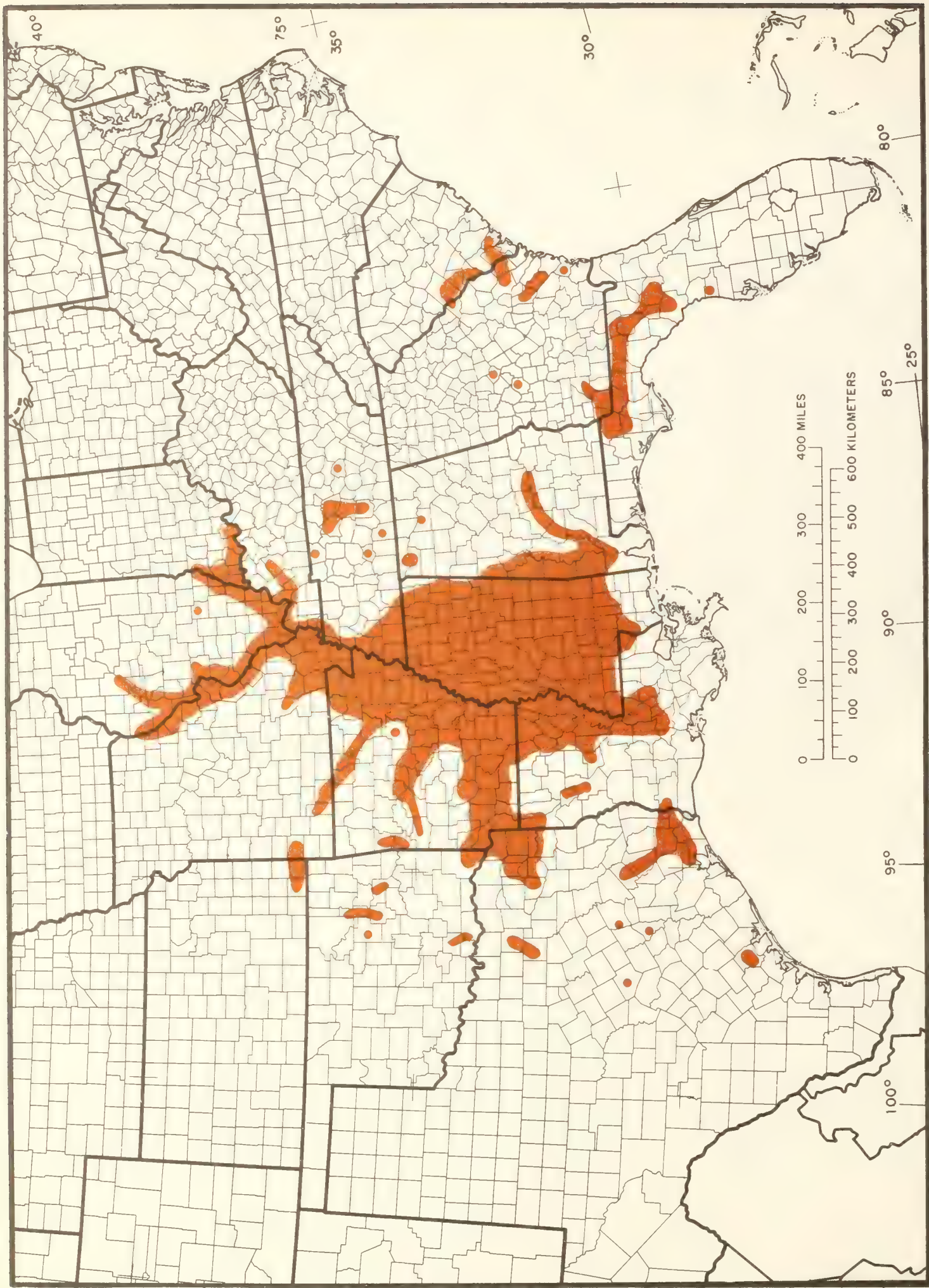
Map 48-SE. *Erythrina herbacea* L., eastern coralbean.



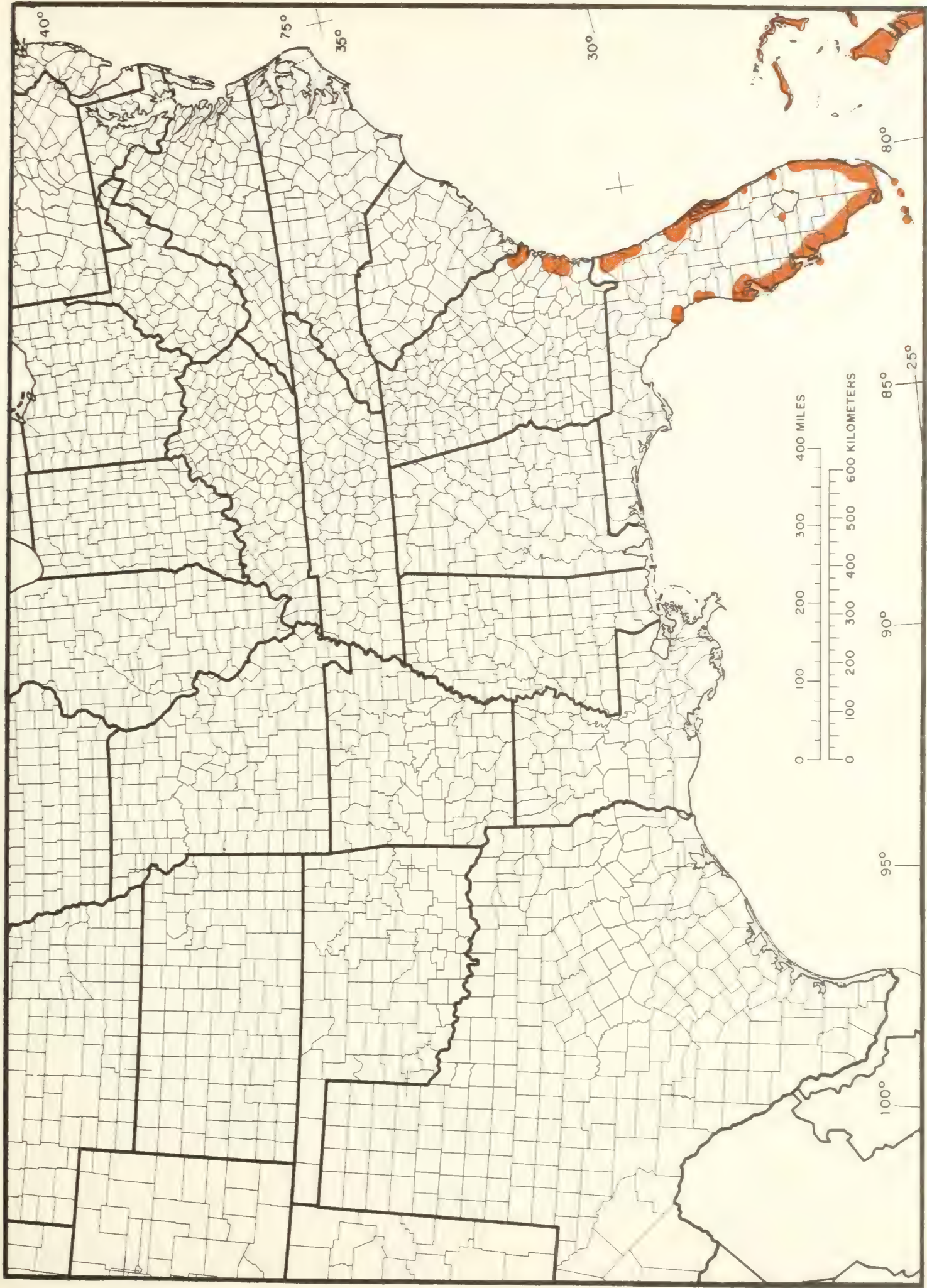
Map 49-NE. *Euonymus atropurpureus* Jacq., eastern wahoo.



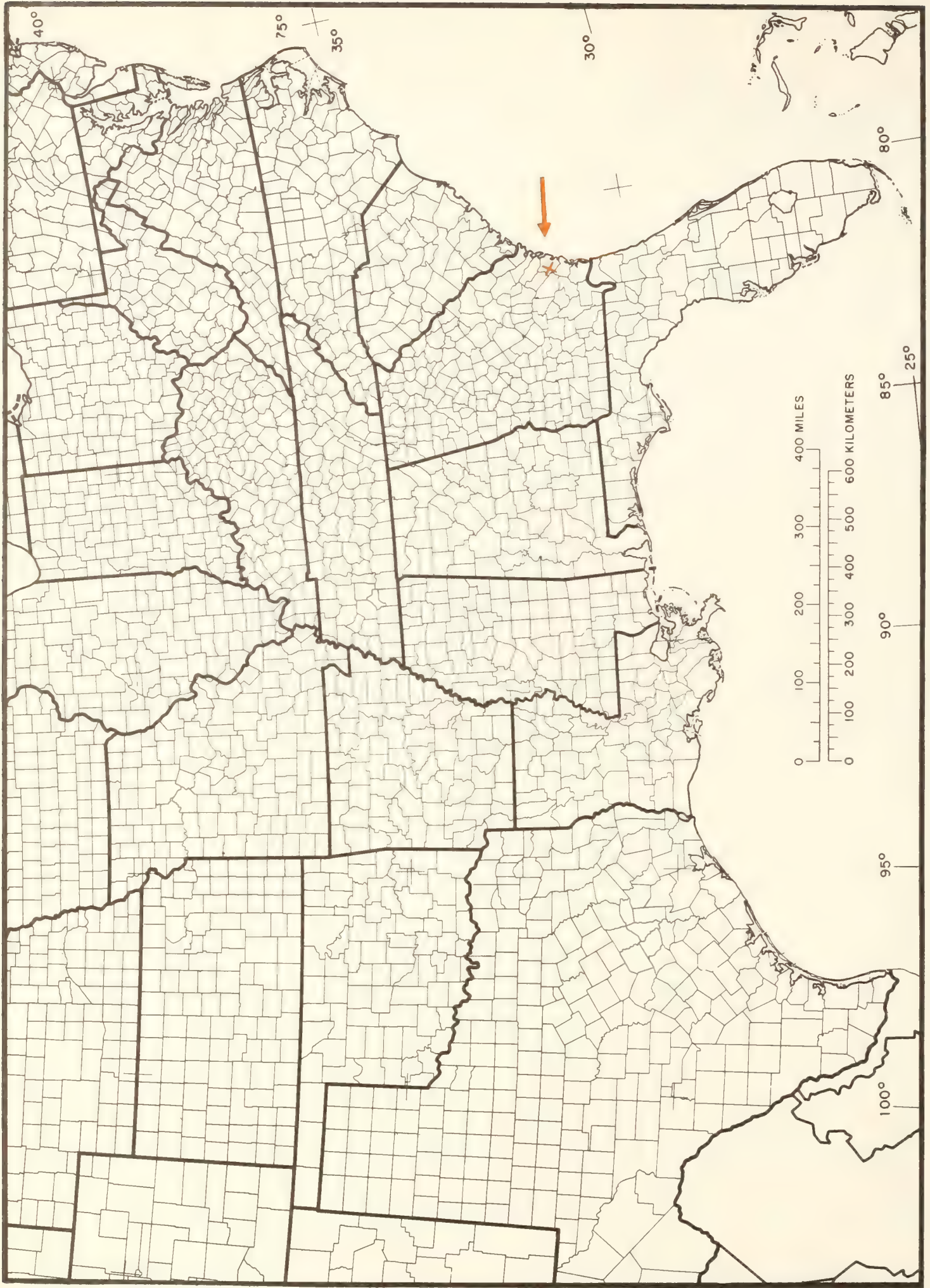
Map 49 SE. *Erionymys atropurpureus* Jacq., eastern wahoo.



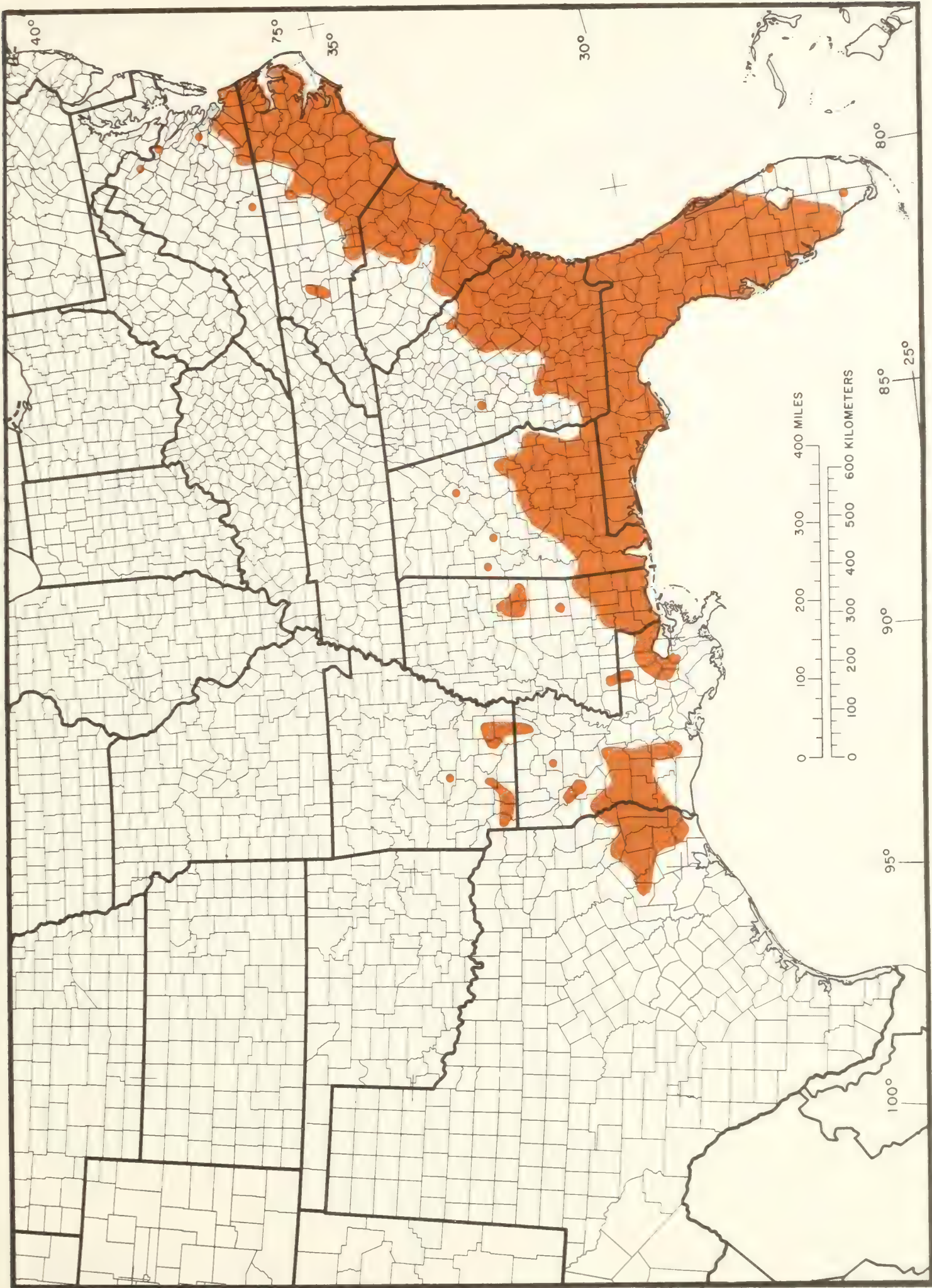
Map 50. *Forestiera acuminata* (Michx.) Poir., swamp-privet.



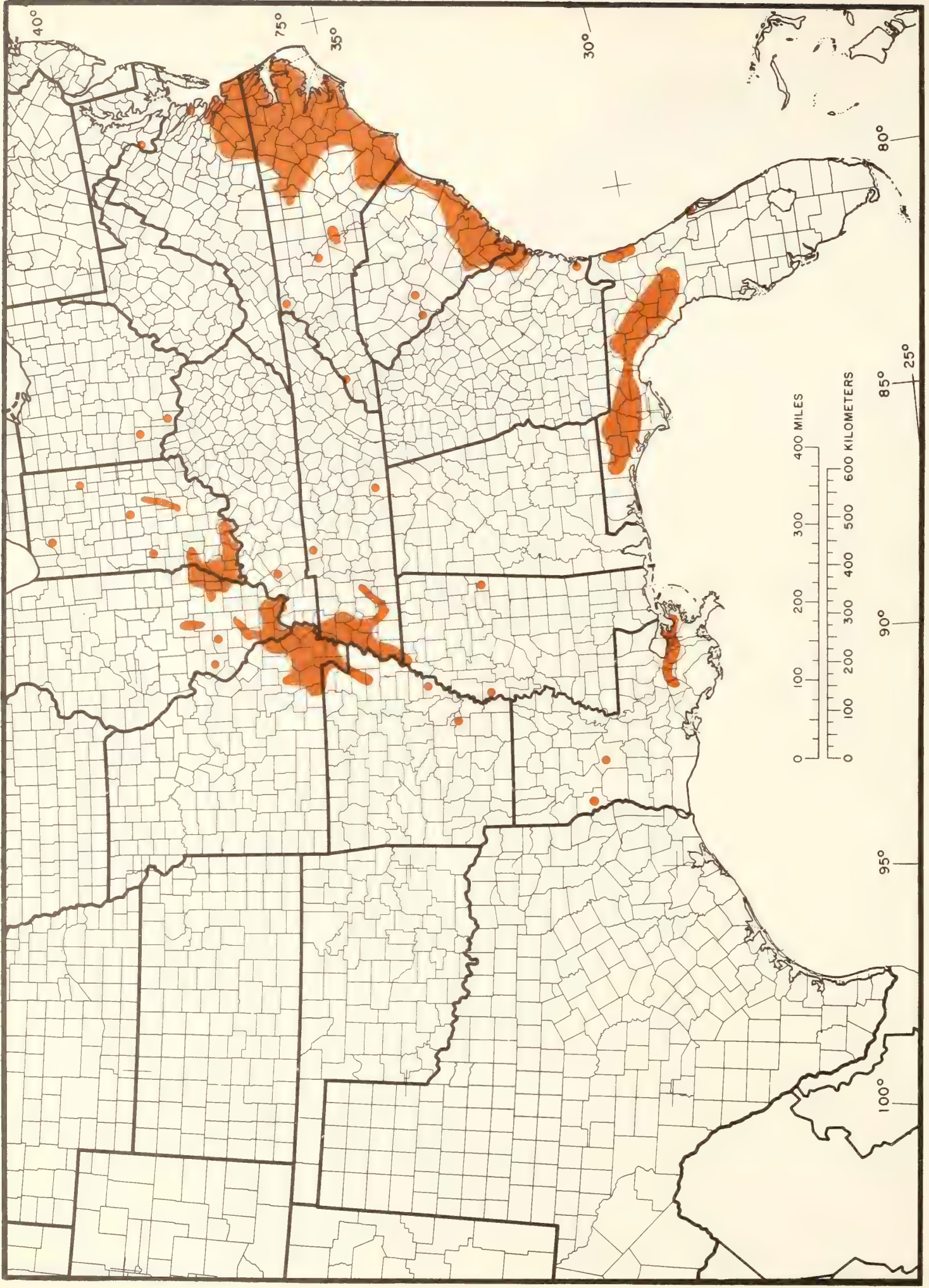
Map 51. *Foresteria segregata* (Jacq.) Krug & Urban, Florida private. Also in Bermuda and widespread through West Indies including Bahama Is., P. R., and V. I.



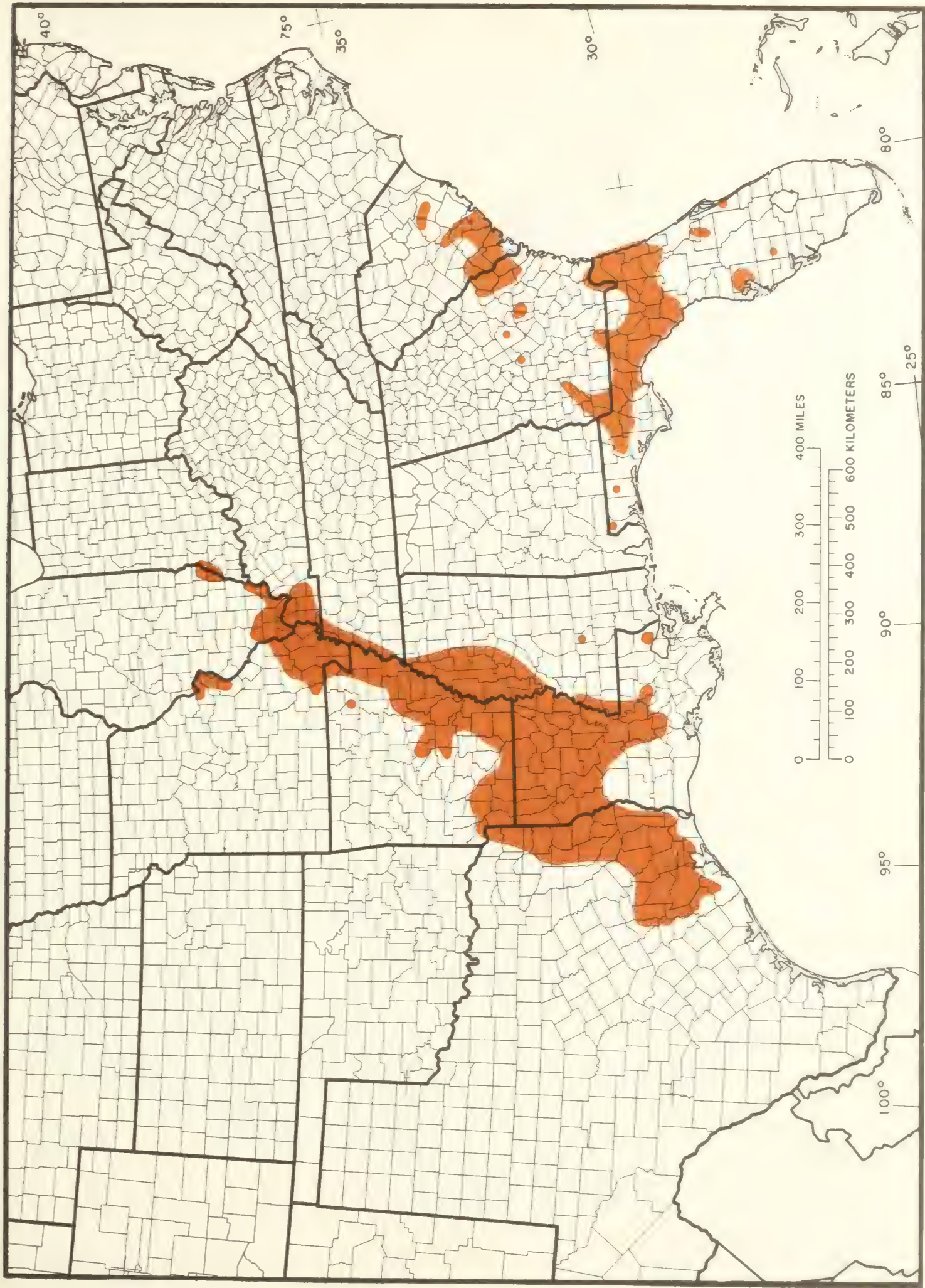
Map 52. *Franklinia alatamaha* Bartr., franklinia. Formerly known from McIntosh Co., Ga., extinct as native and known only in cultivation.



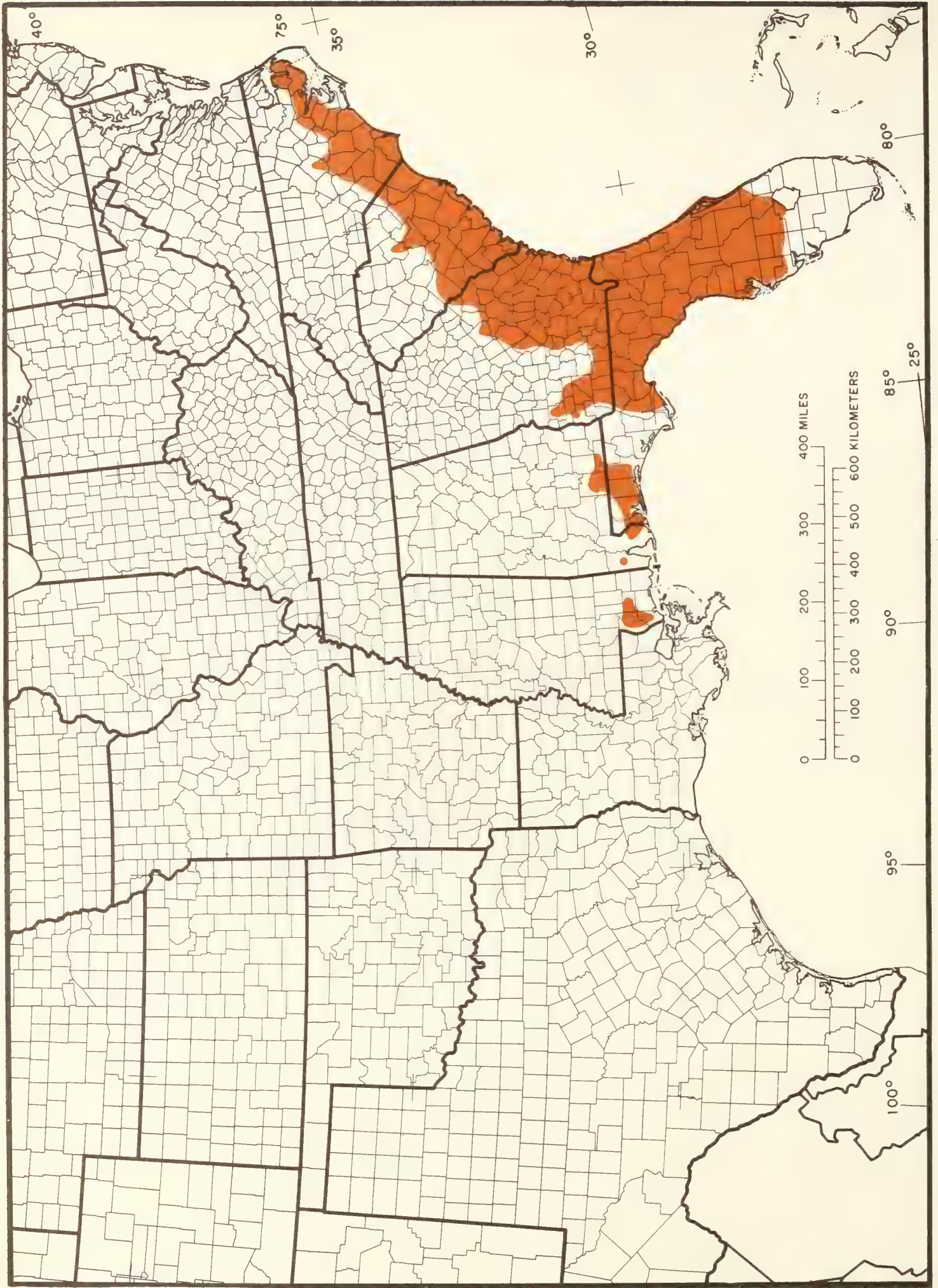
Map 53. *Fraxinus caroliniana* Mill., Carolina ash. Also a var. in Cuba.



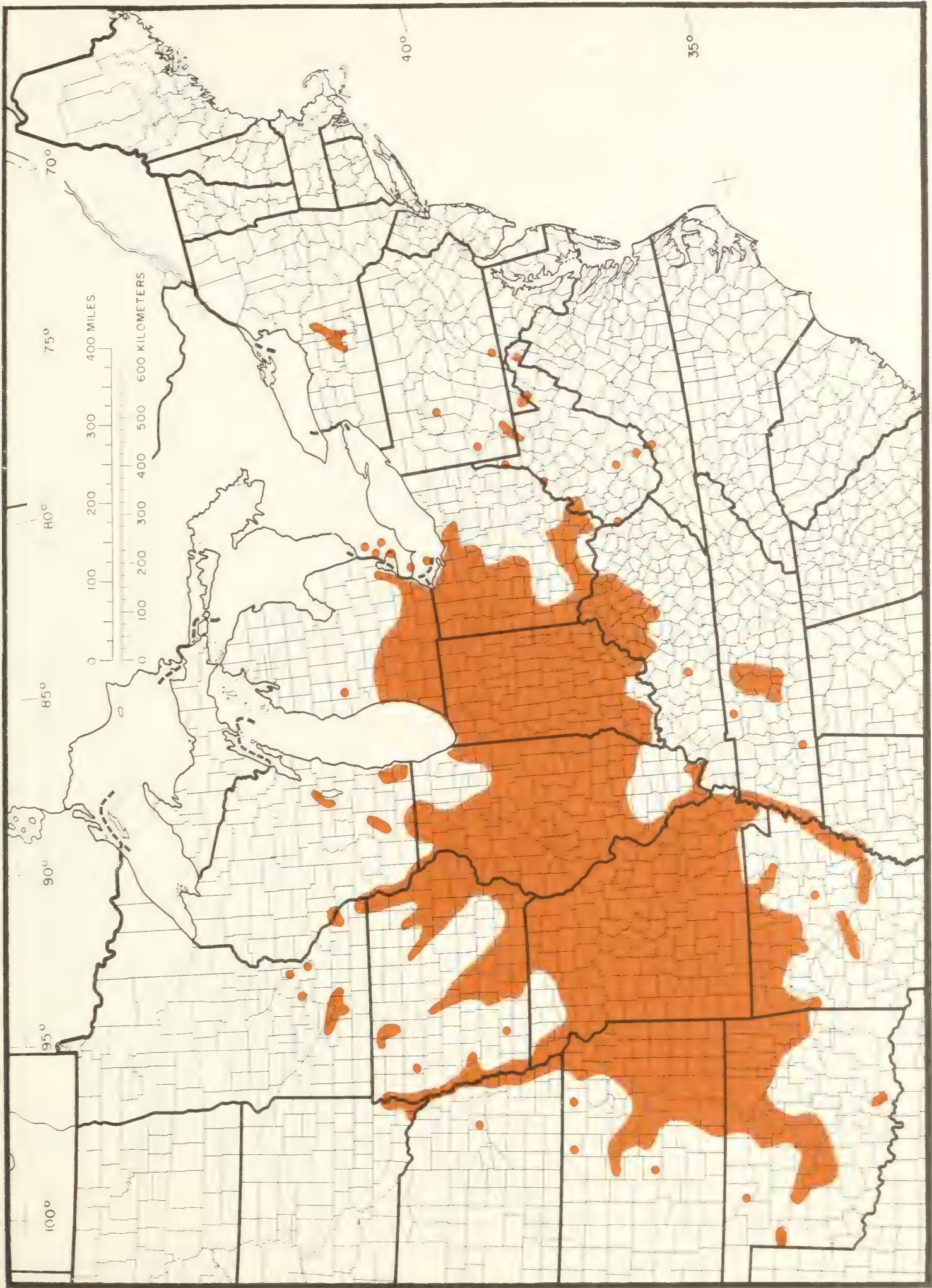
Map 54. *Fraxinus profunda* (Bush) Bush, pumpkin ash.



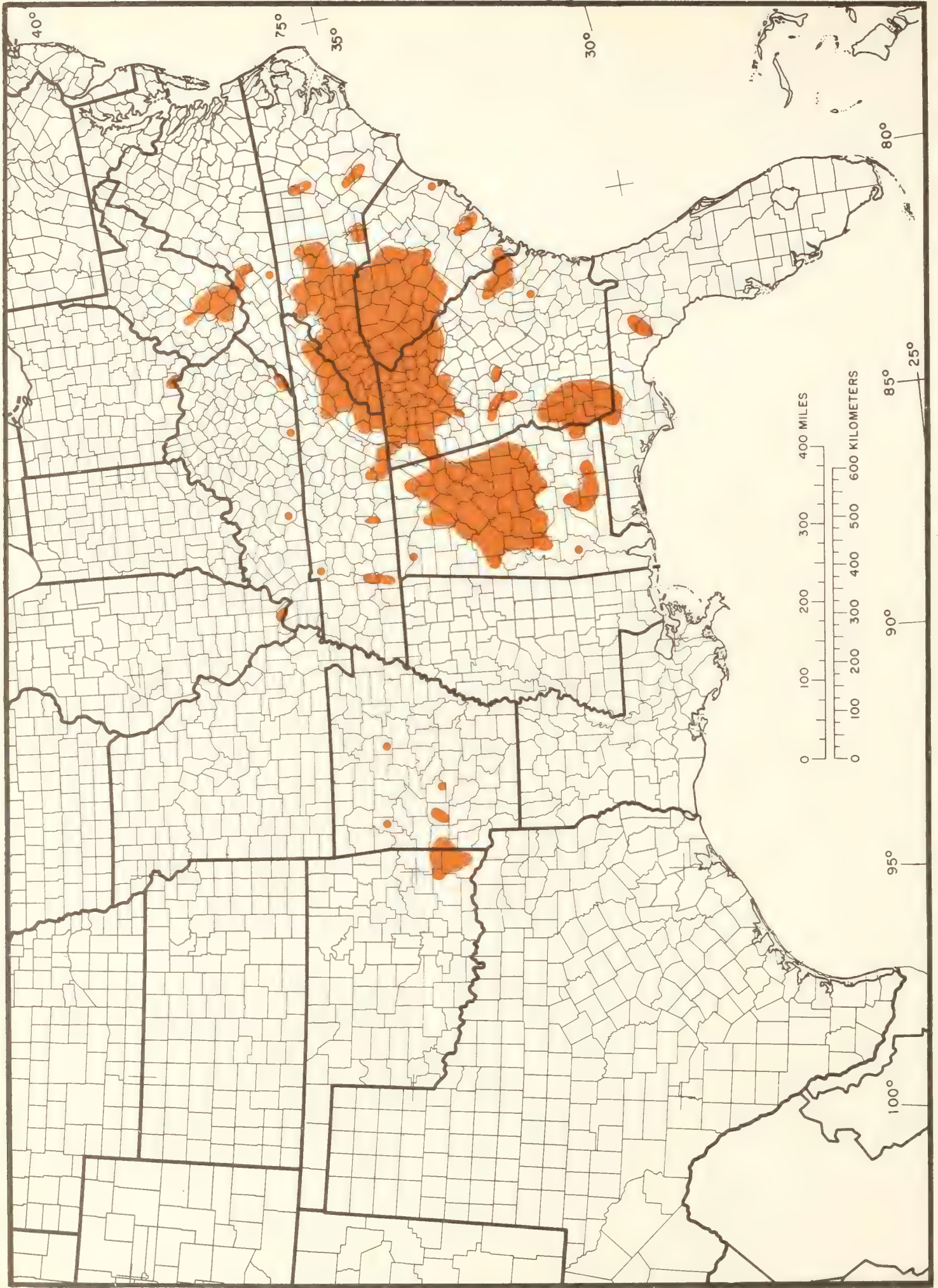
Map 55. *Glebionia aquatica* Marsh., waterlocust.



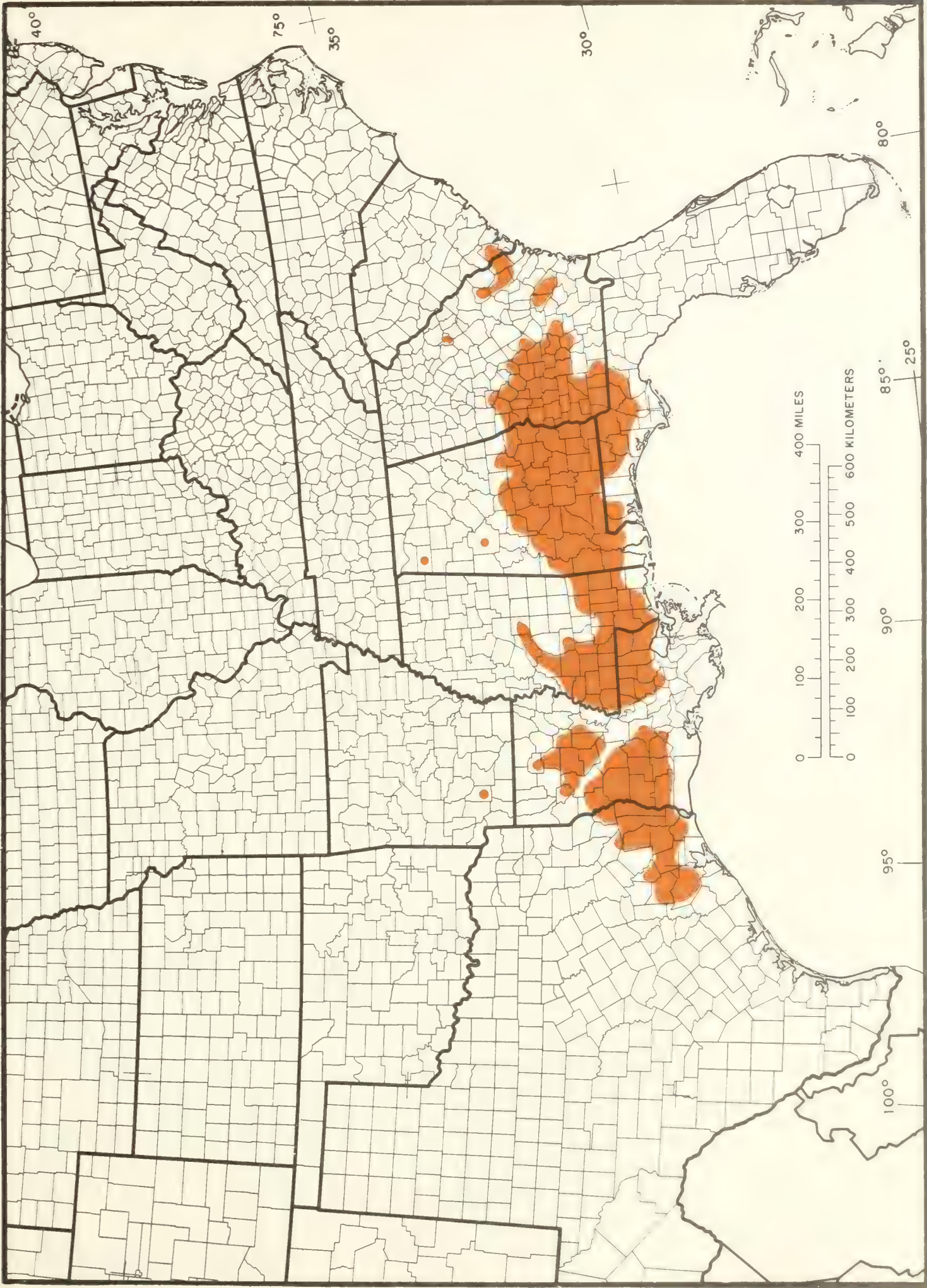
Map 56. *Gordonia lasianthus* (L.) Ellis, loblolly-bay.



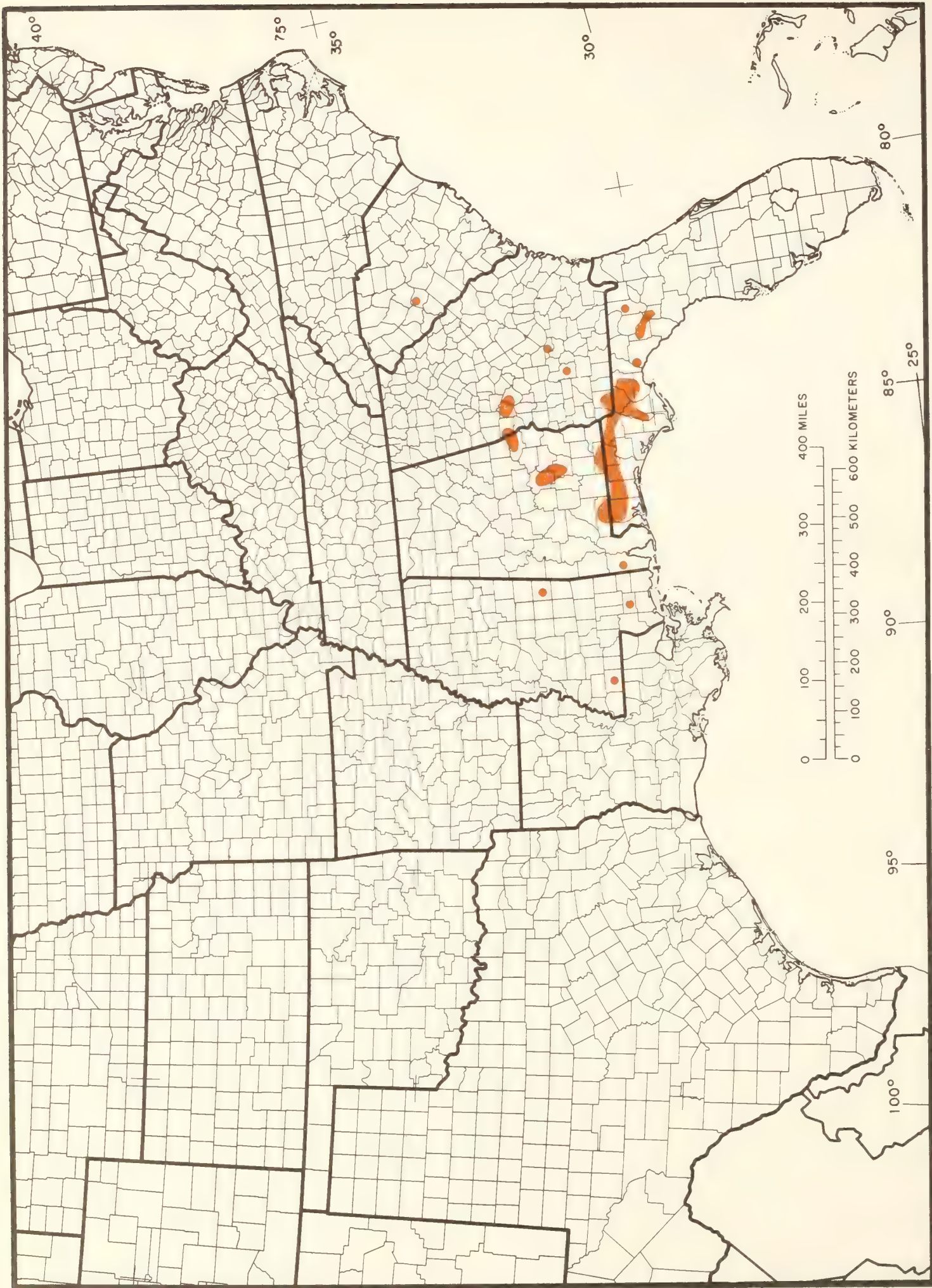
Map 57. *Gymnocladus dioica* (L.) K. Koch, Kentucky coffeetree.



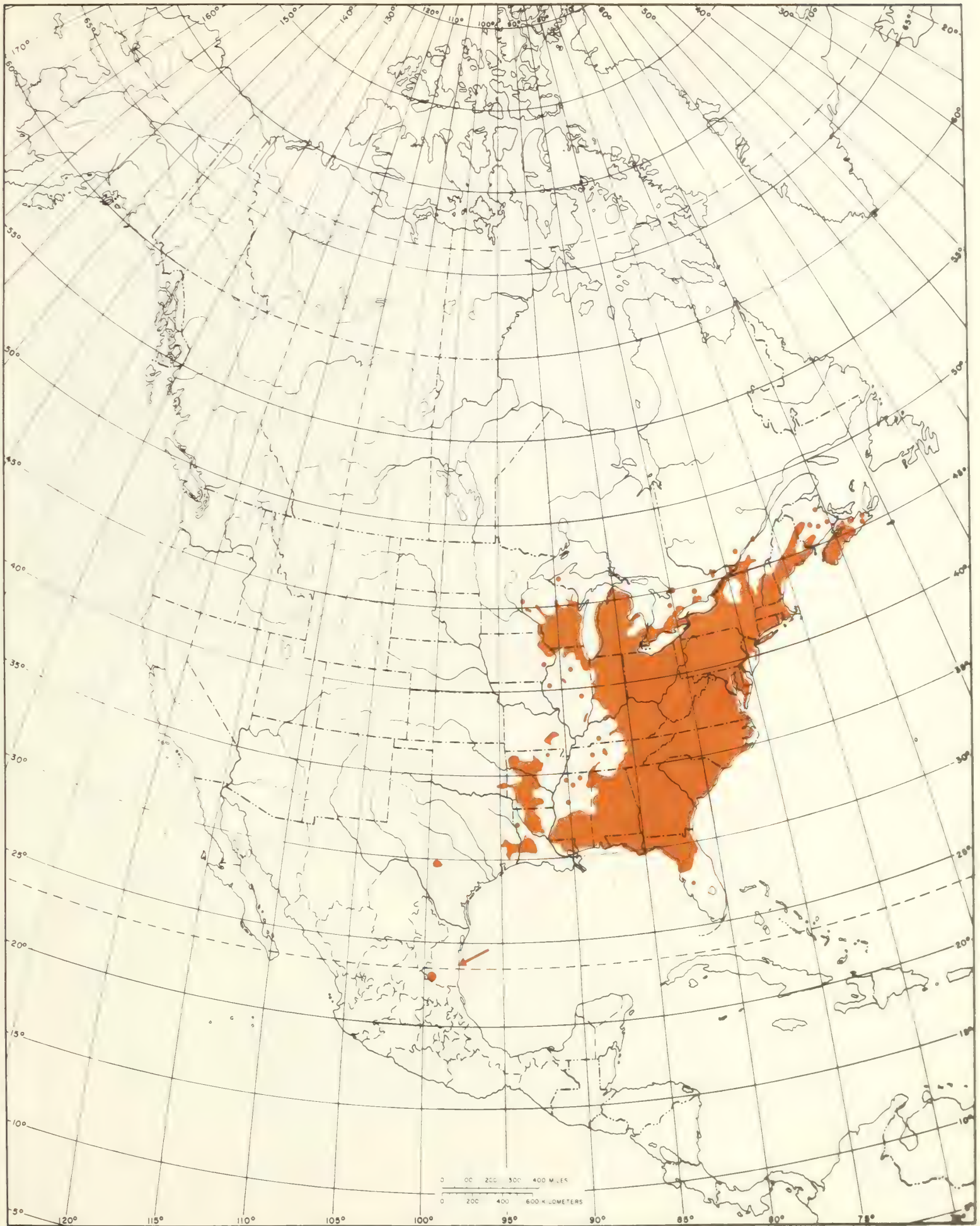
Map 58. *Halesia carolina* L., Carolina silverbell.



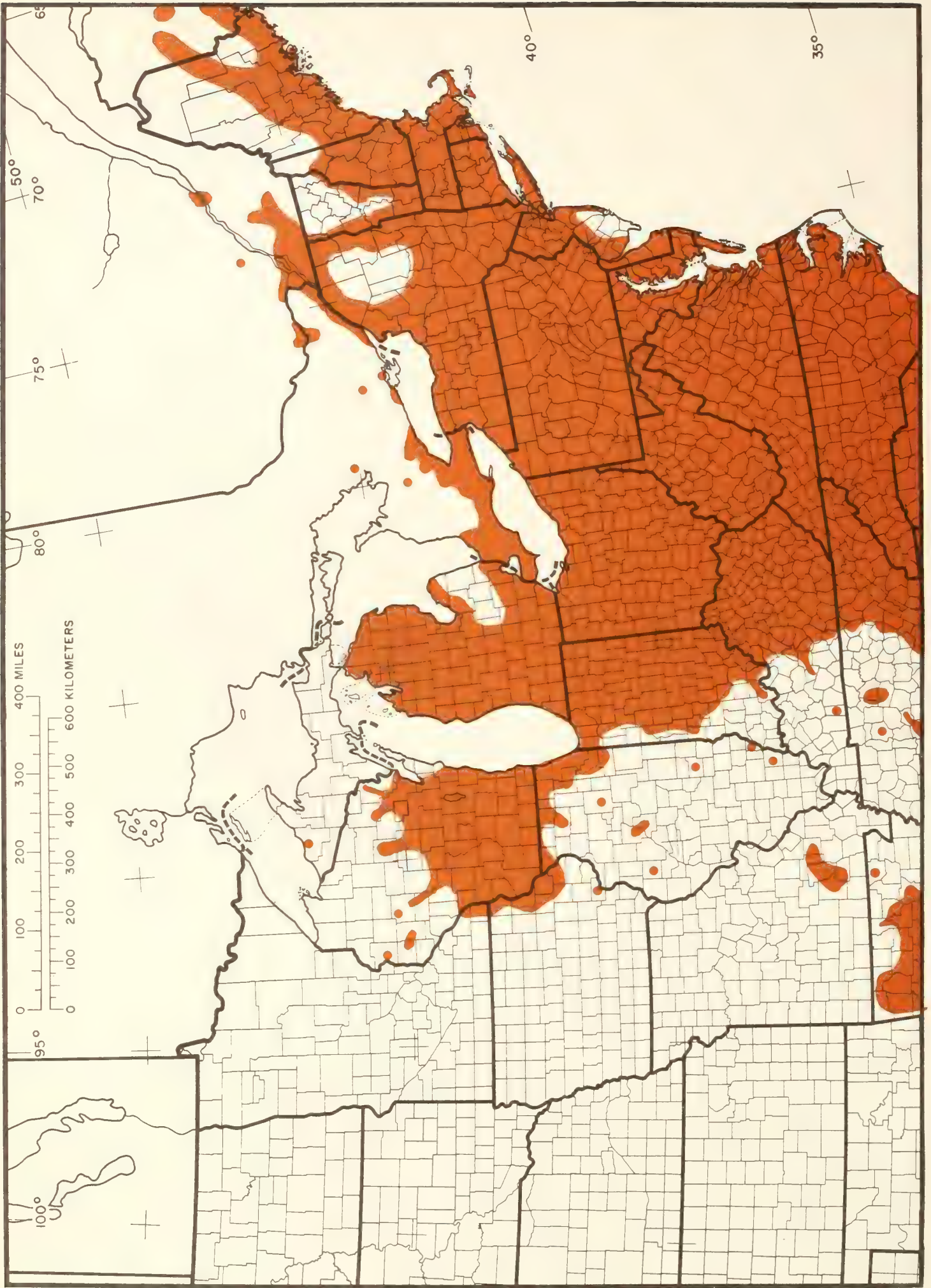
Map 59. *Halesia diptera* Ellis, two-wing silverbell.



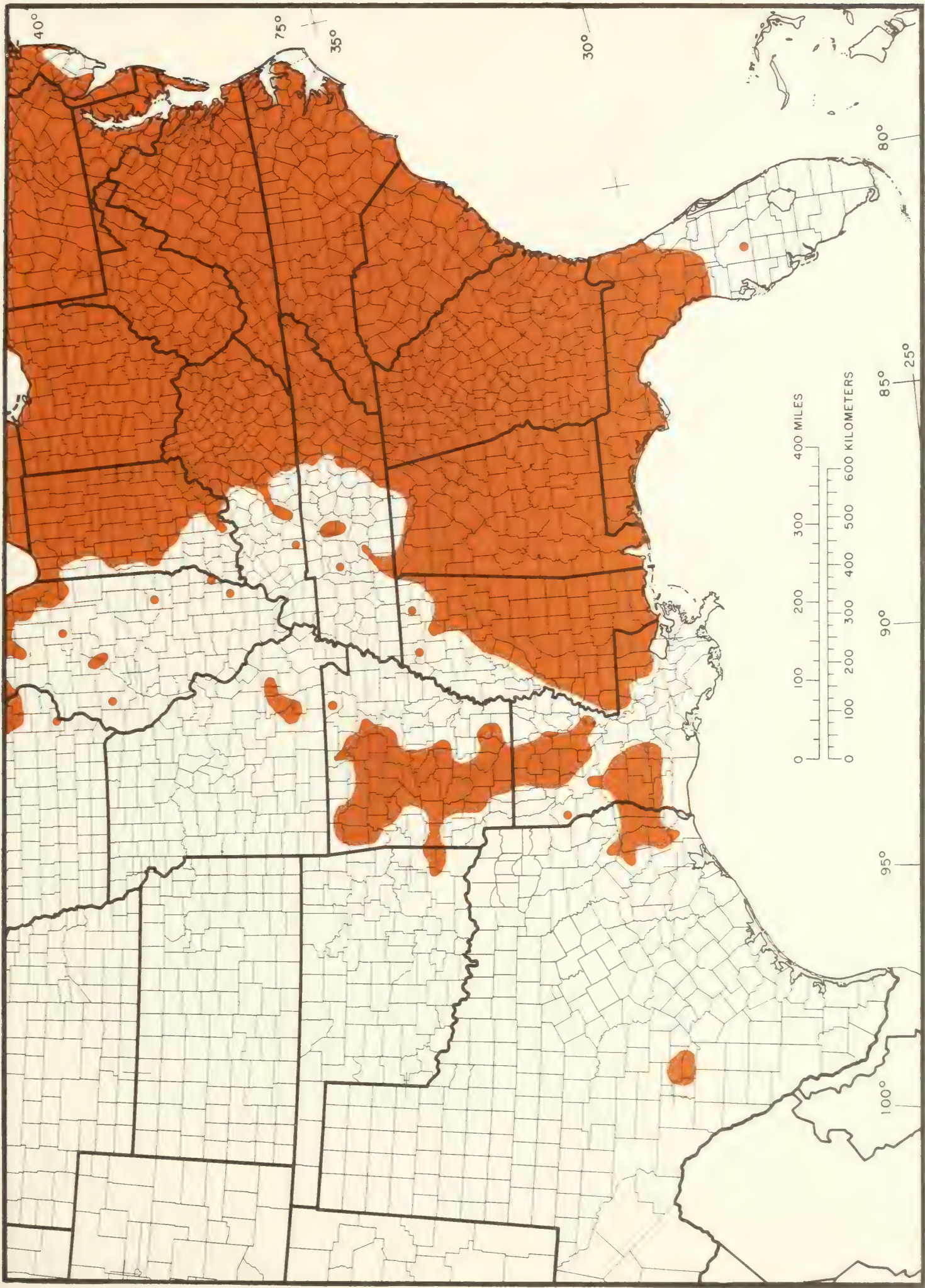
Map 60. *Halesia parviflora* Michx., little silverbell.



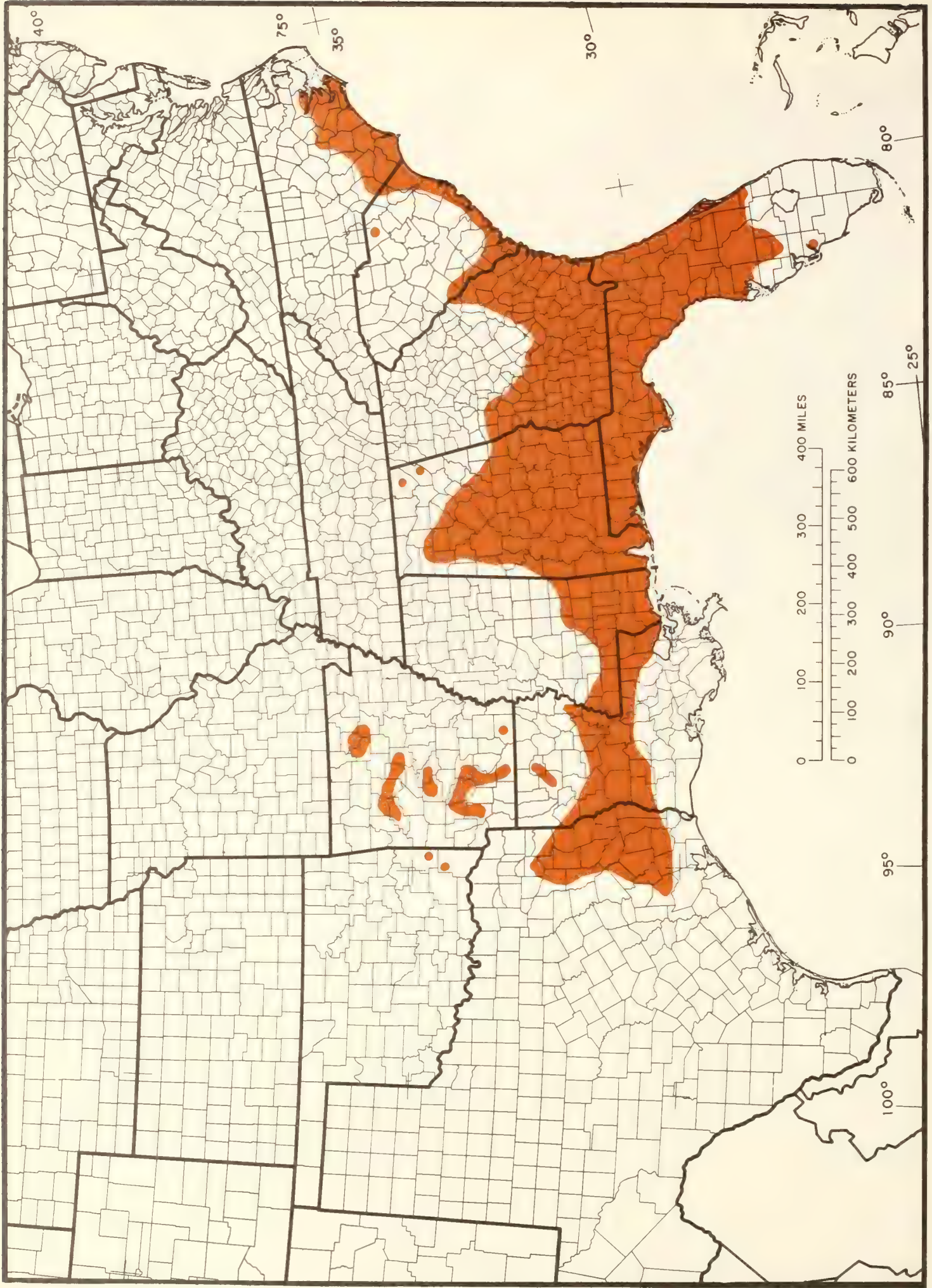
Map 61-N. *Hamamelis virginiana* L., witch-hazel.



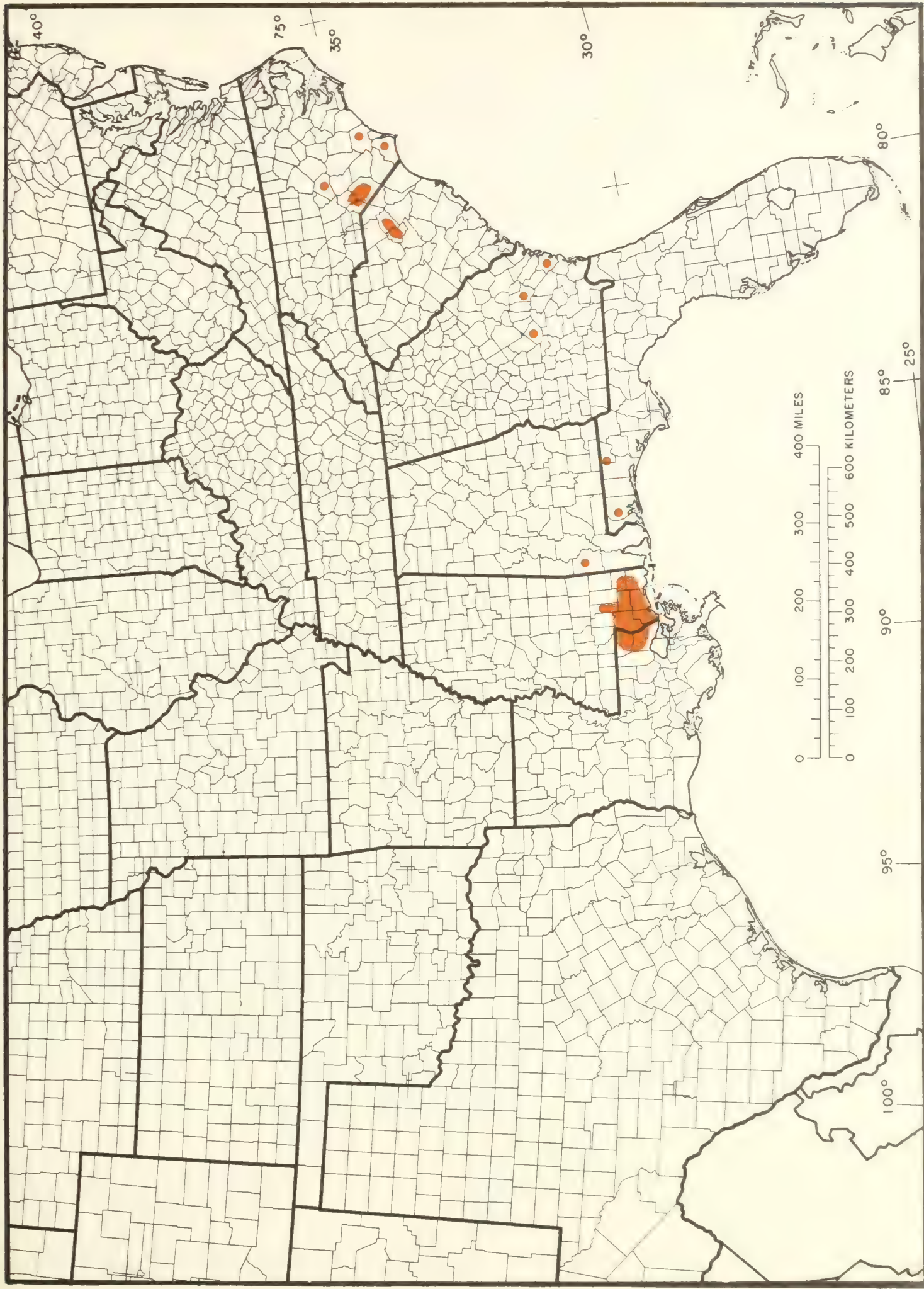
Map 61-NE. *Hamamelis virginiana* L., witch-hazel.



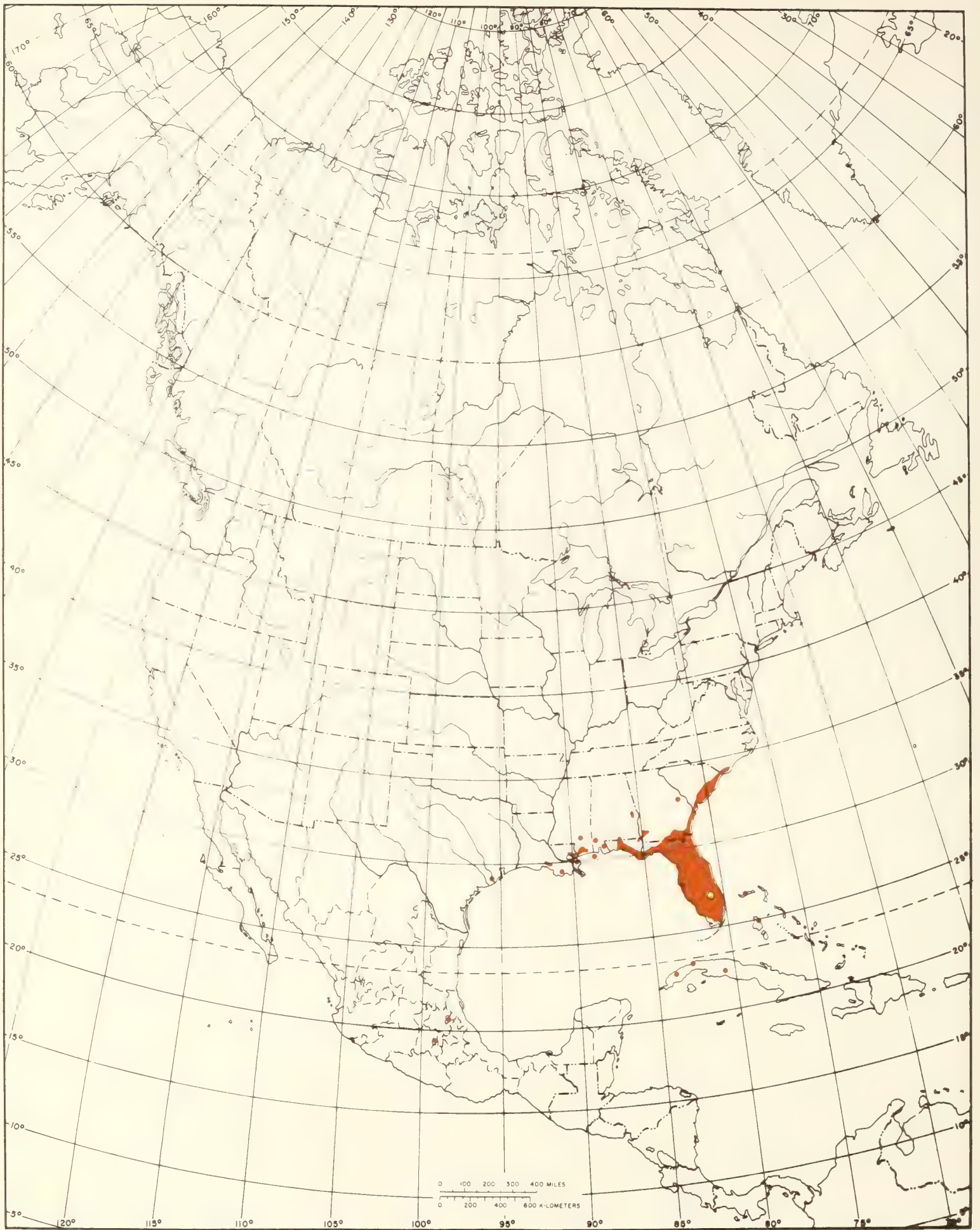
Map 61-S.E. *Hamamelis virginiana* L., witch-hazel.



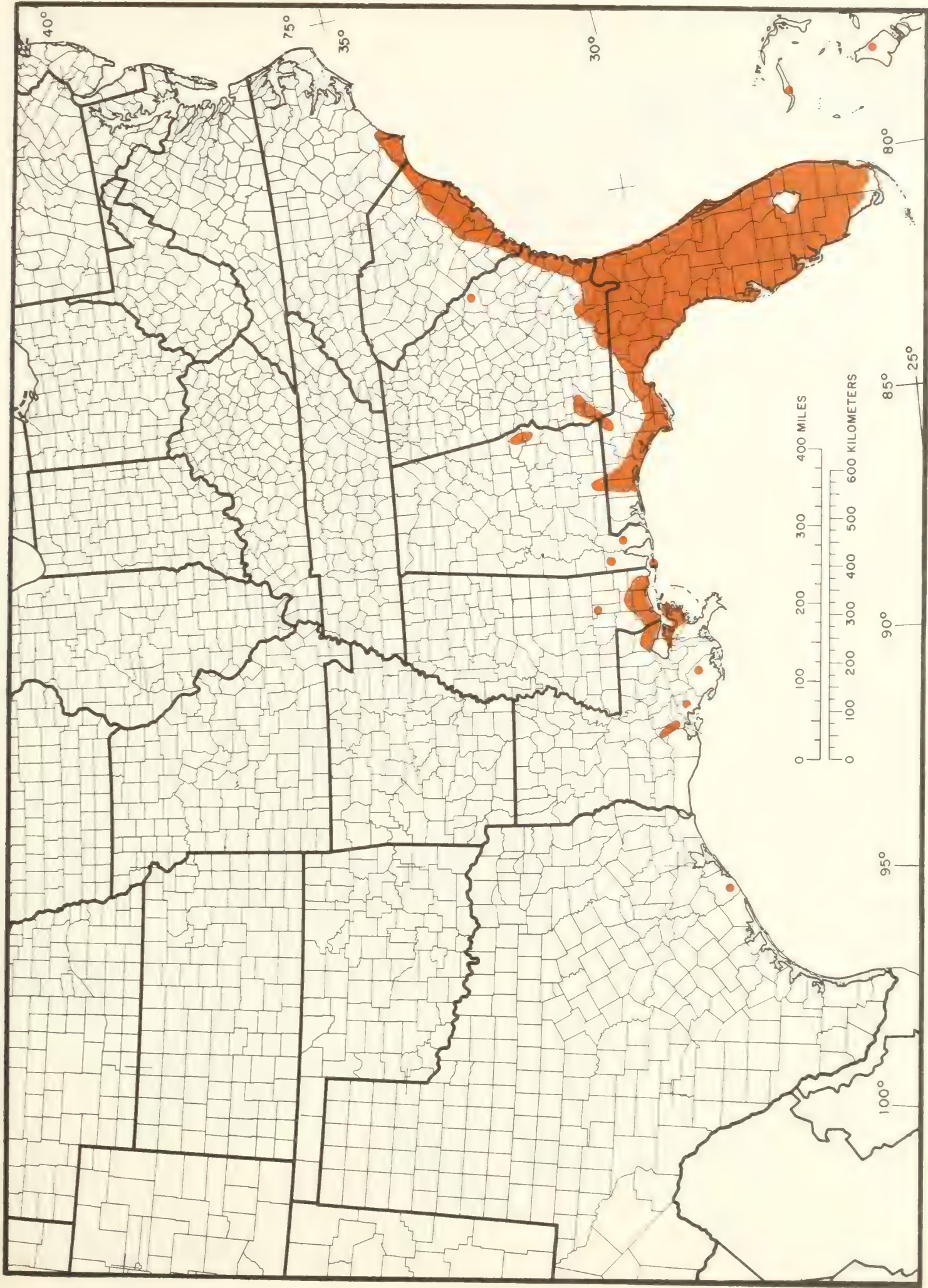
Map 62. *Ilex ambigua* (Michx.) Torr., Carolina holly.



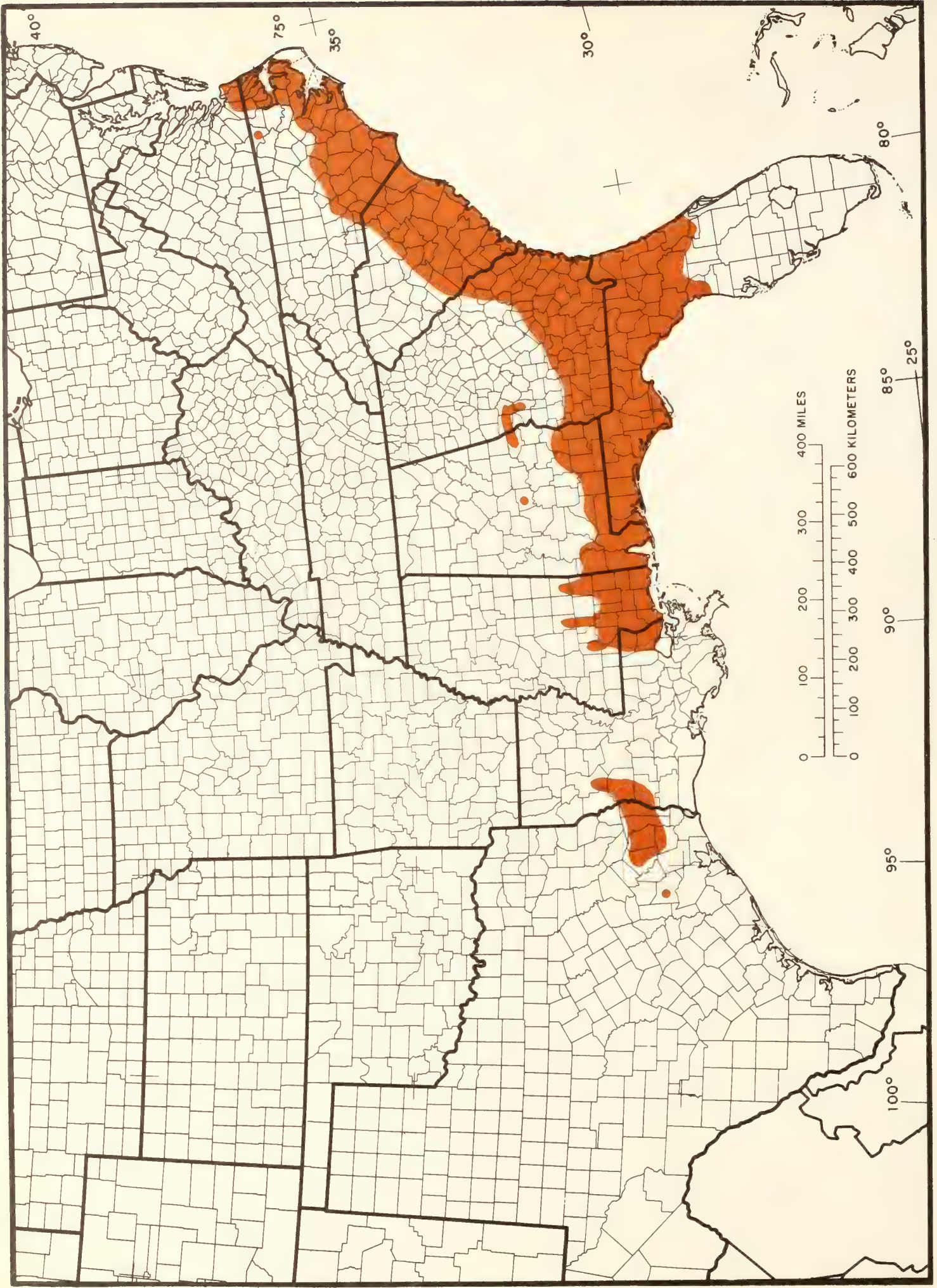
Map 63. *Ilex amelauchter* M. A. Curt., sarvis holly.



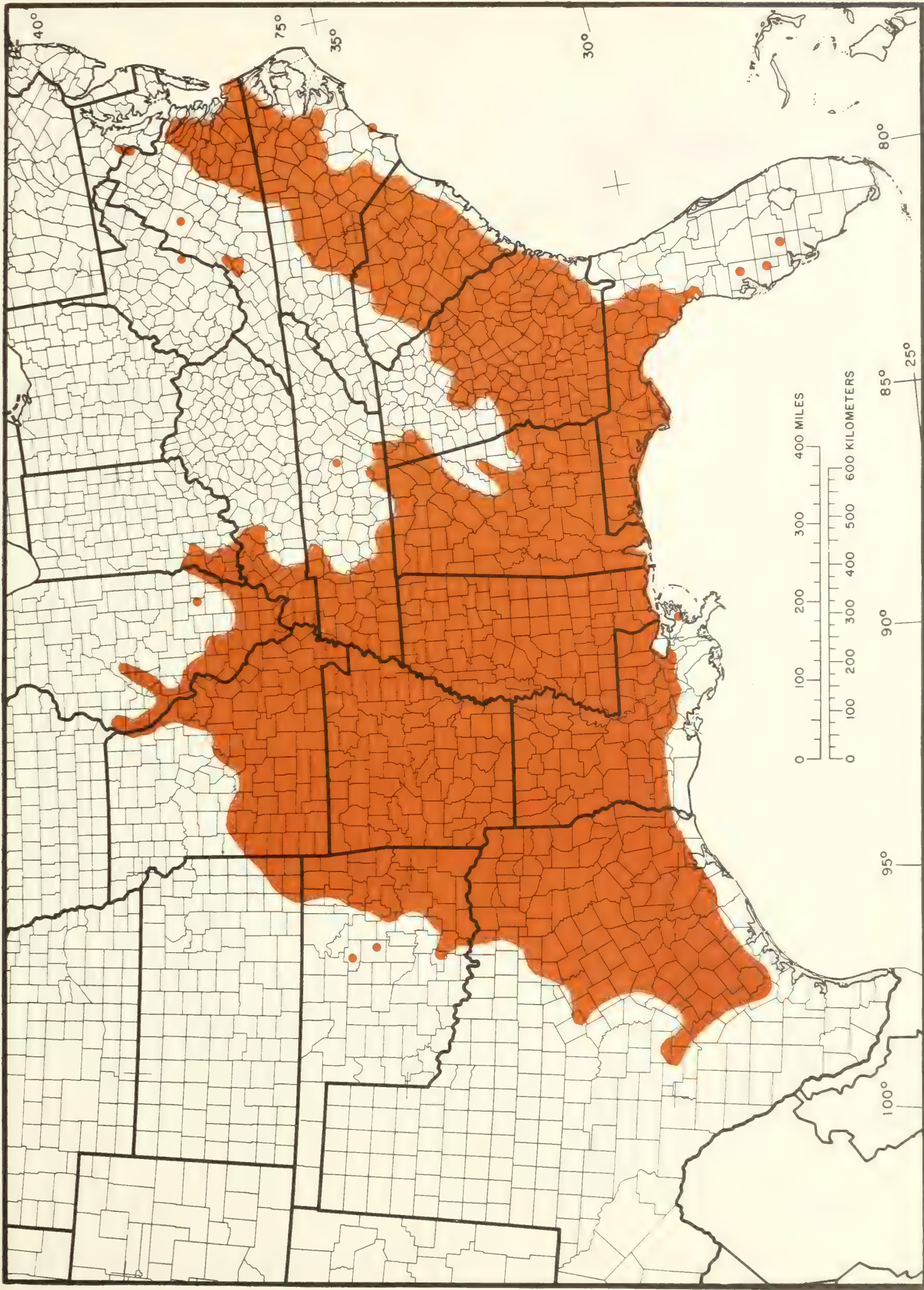
Map 64-N. *Ilex cassine* L., dahoon.



Map 64-SE. *Ilex cassine* L., dahoon.



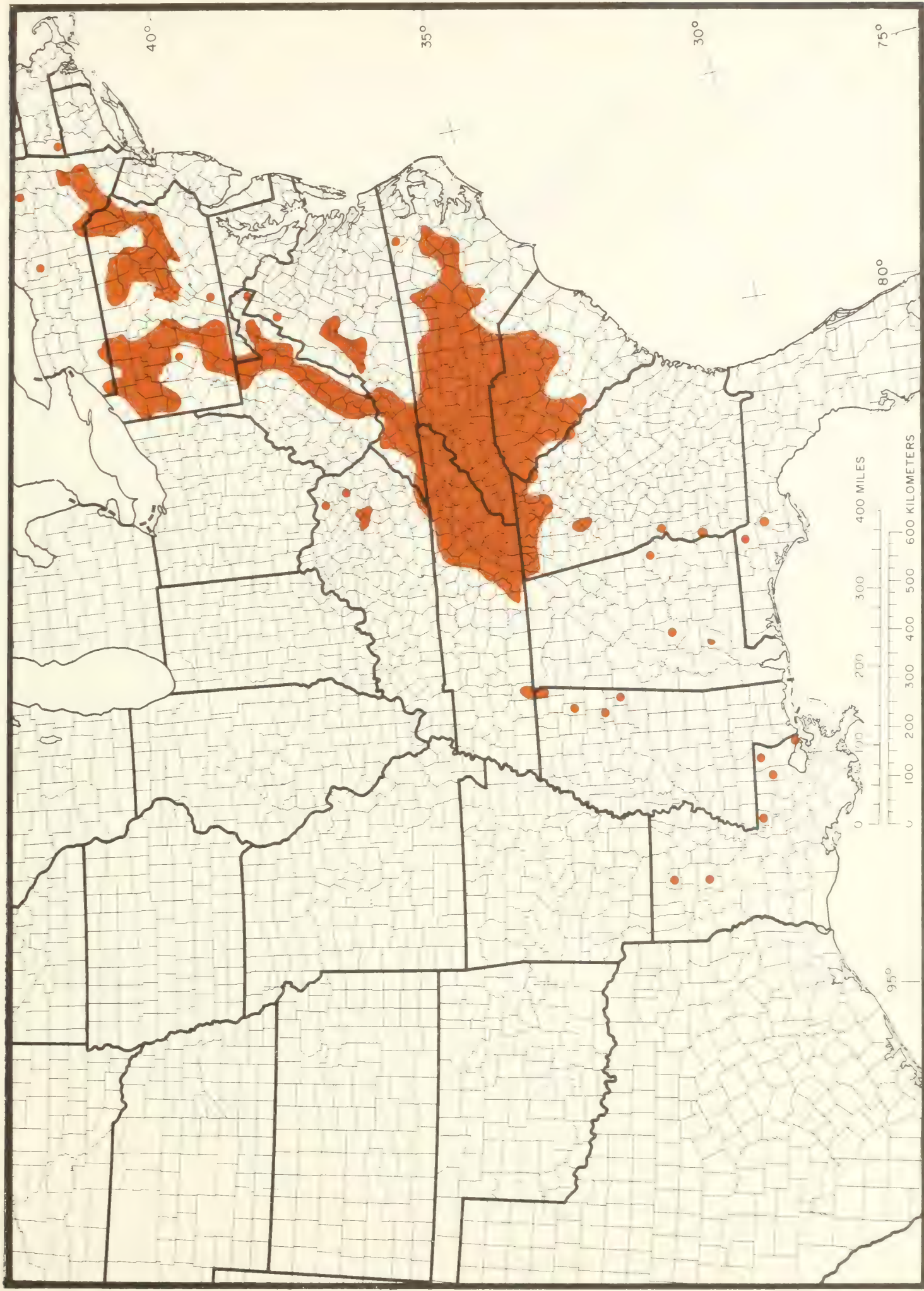
Map 65. *Ilex coriacea* (Pursh) Chapm., large gallberry.



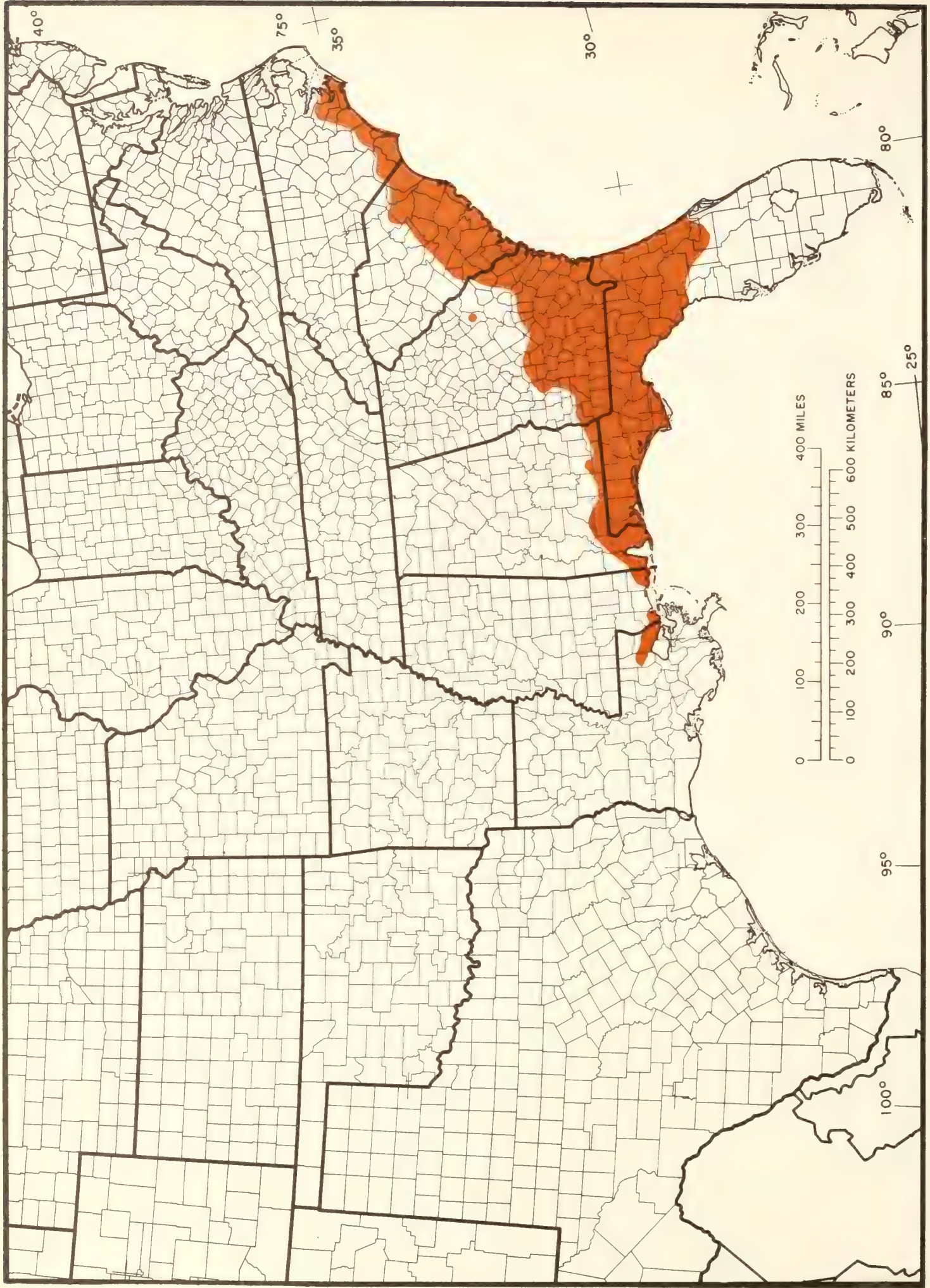
Map 66. *Ilex decidua* Walt., possumhaw. Also nr. Mex. (Tamps. and N. L.).



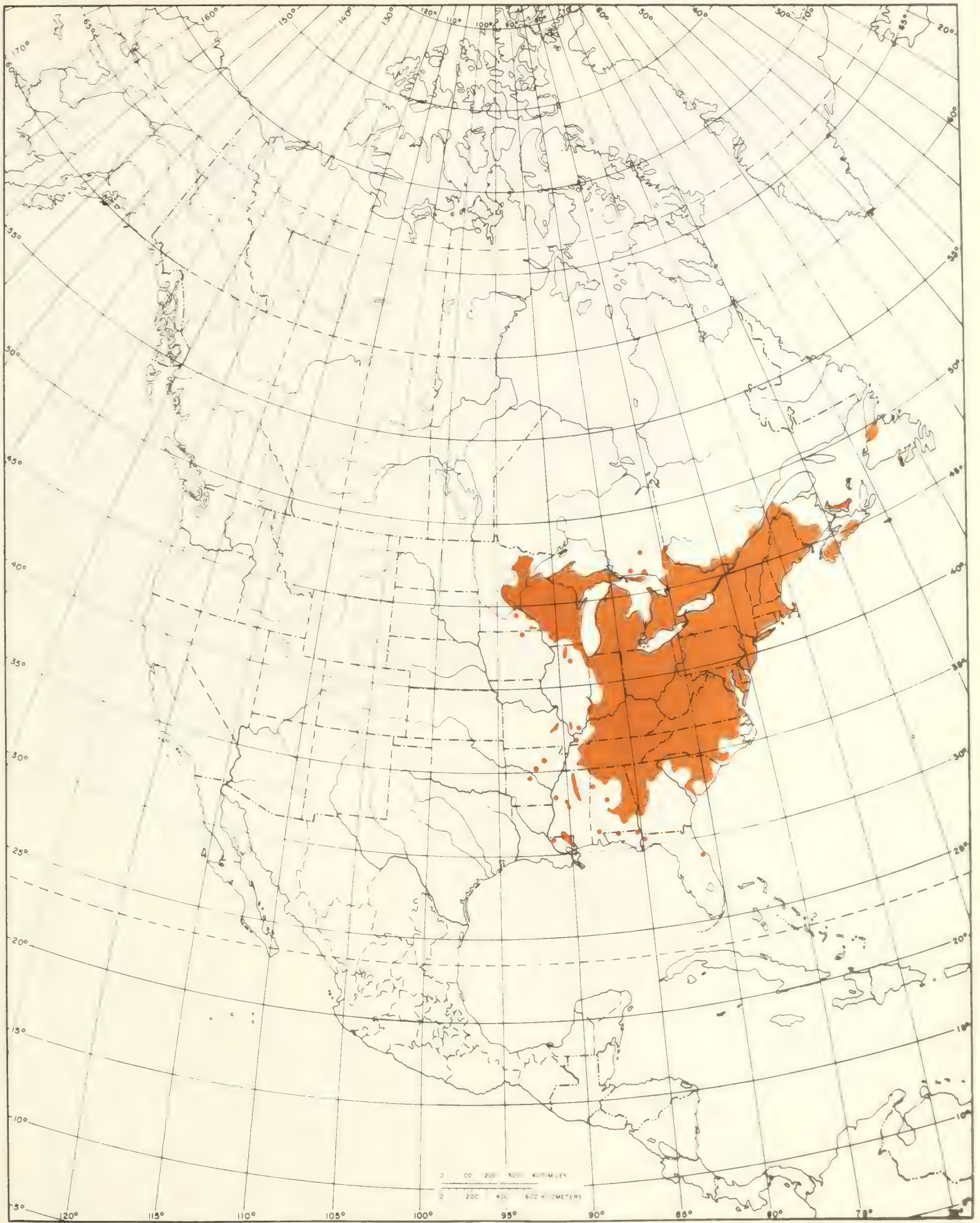
Map 67. *Ilex laevigata* (Pursh) Gray, smooth winterberry.



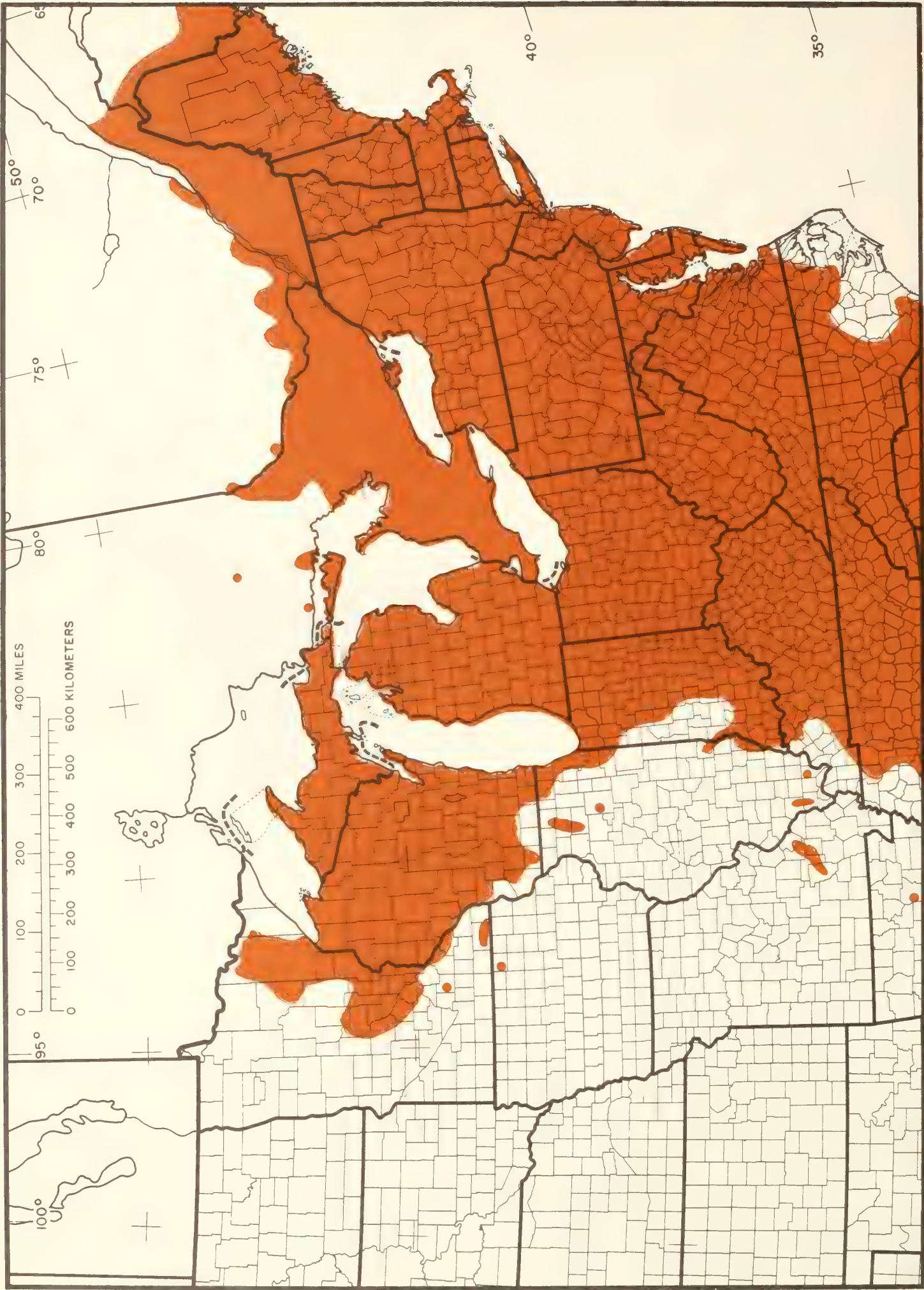
Map 68. *Hex montana* Torr. & Gray, mountain winterberry. Also a var. or closely related sp. in Japan.



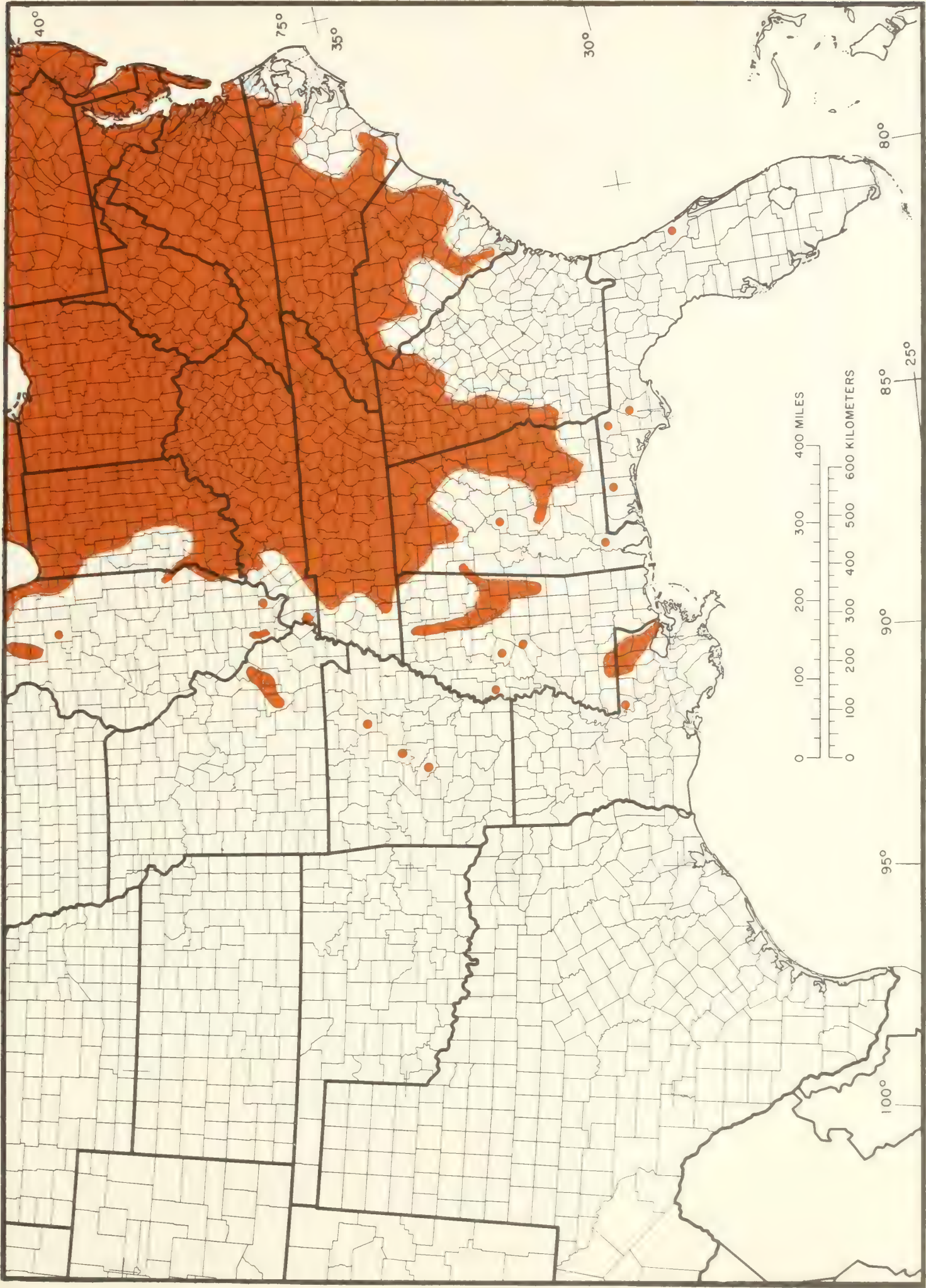
Map 69. *Ilex myrtifolia* Walt., myrtle dahoon.



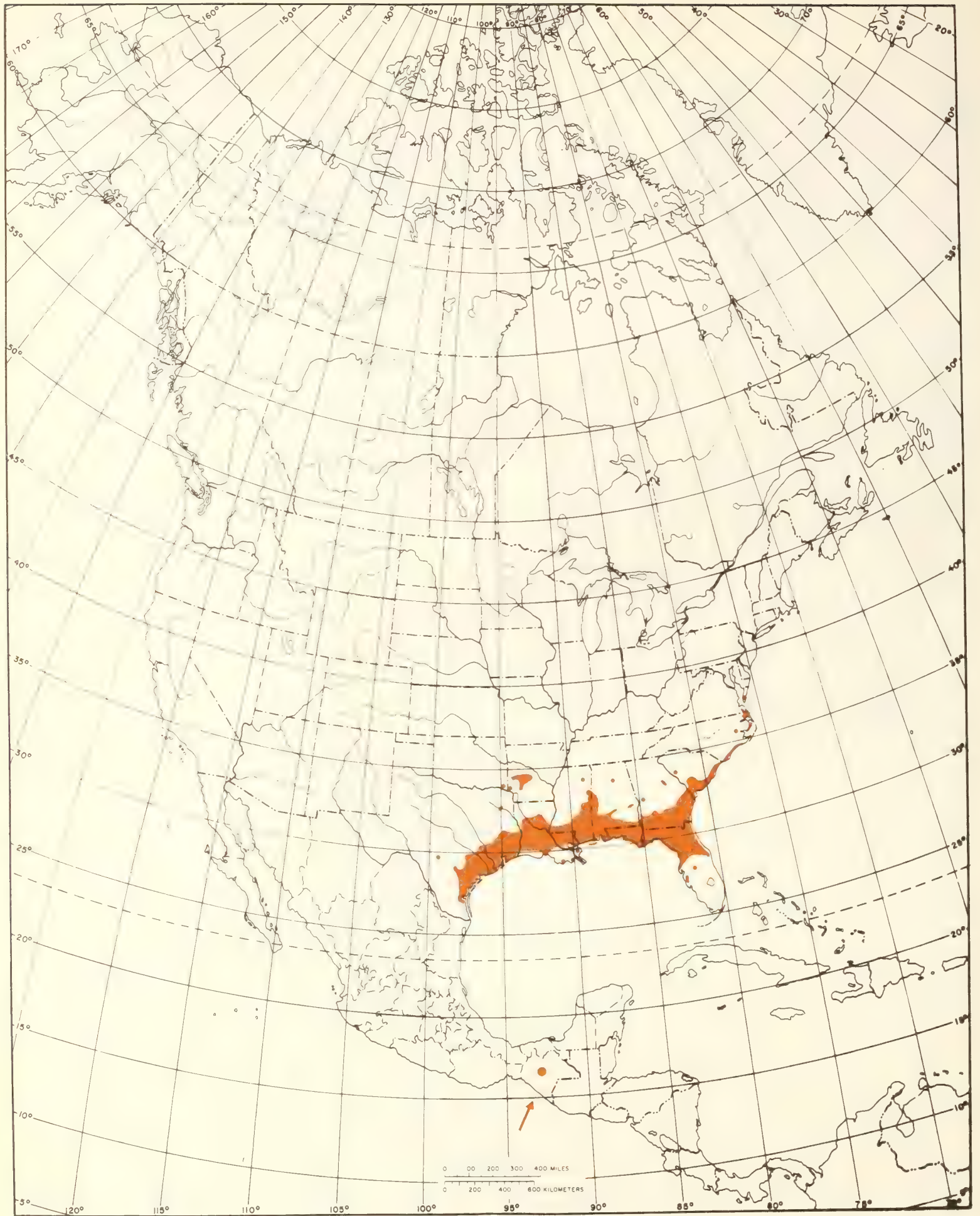
Map 70-N. *Ilex verticillata* (L.) Gray, common winterberry.



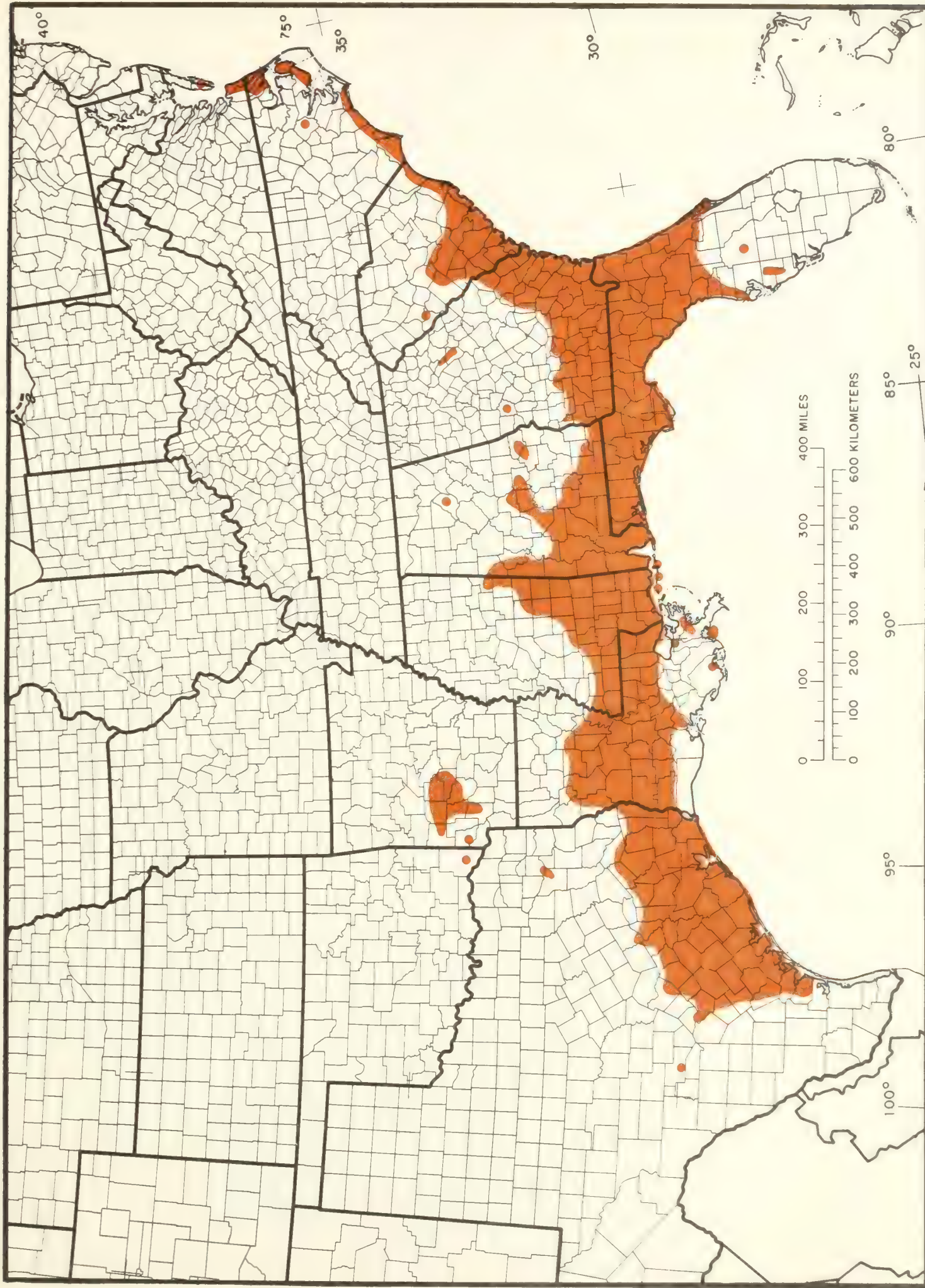
Map 70-NE. *Ilex verticillata* (L.) Gray, common winterberry.



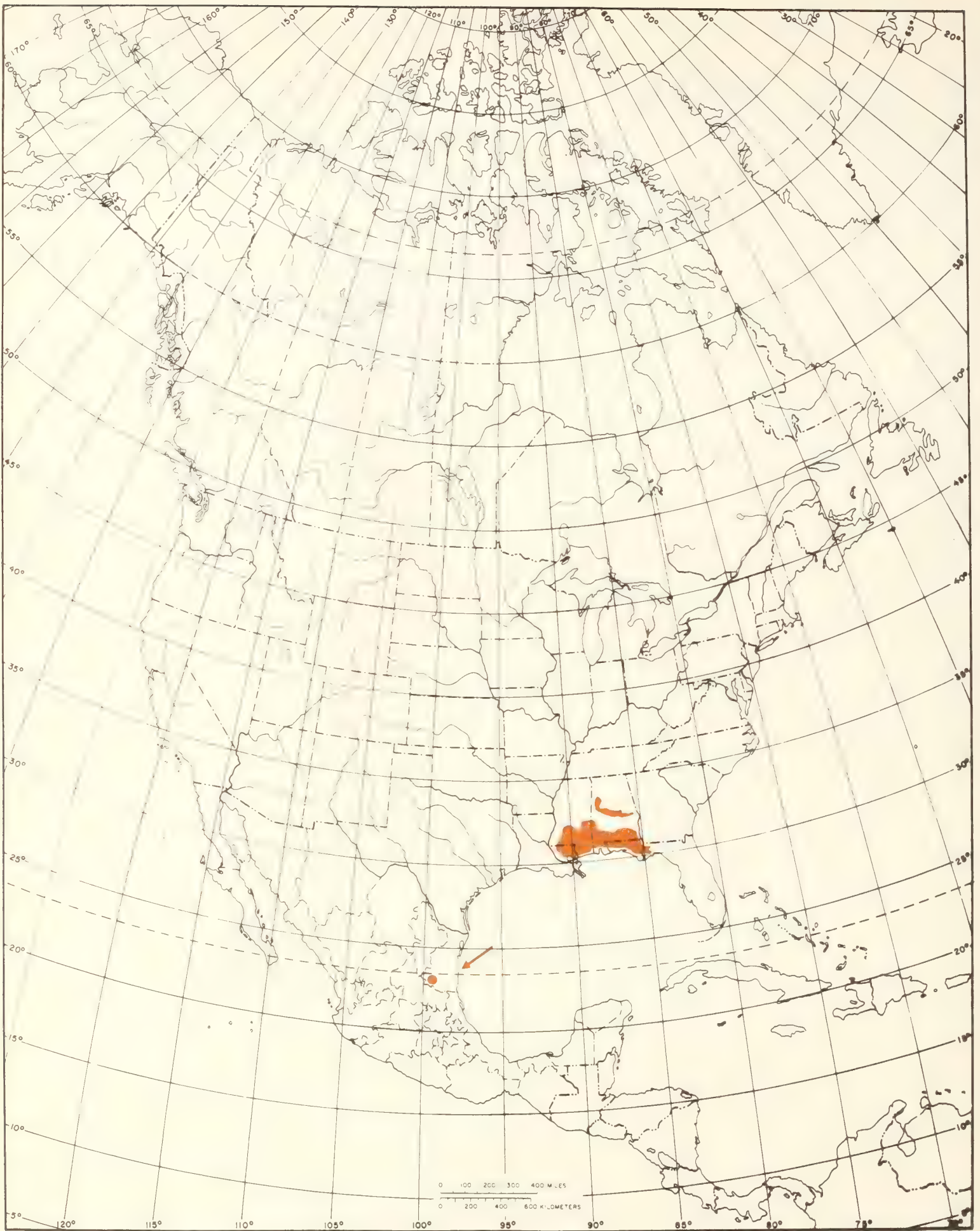
Map 70 SE. *Ilex verticillata* (L.) Gray, common winterberry.



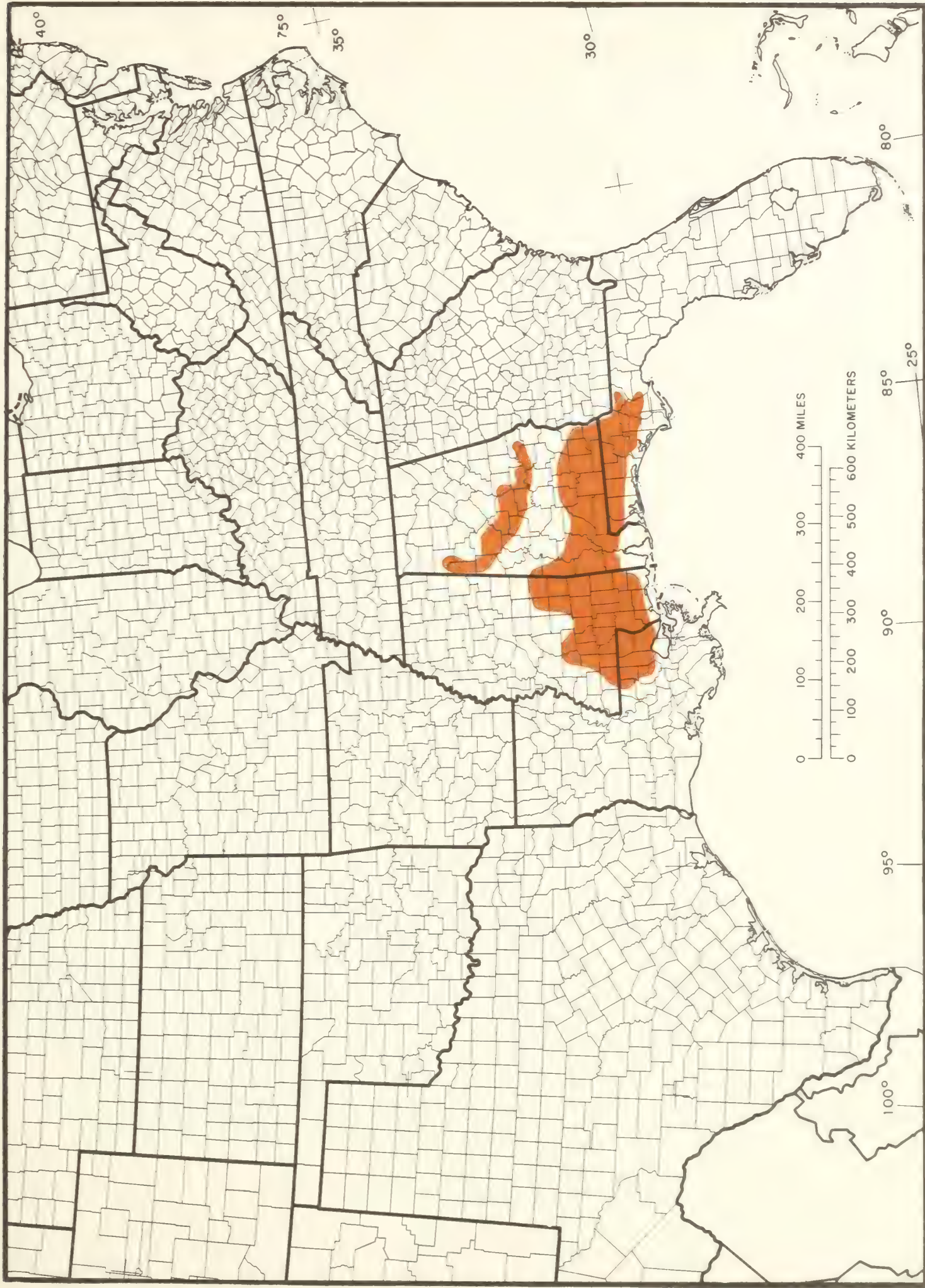
Map 71-N. *Ilex vomitoria* Ait., yaupon.



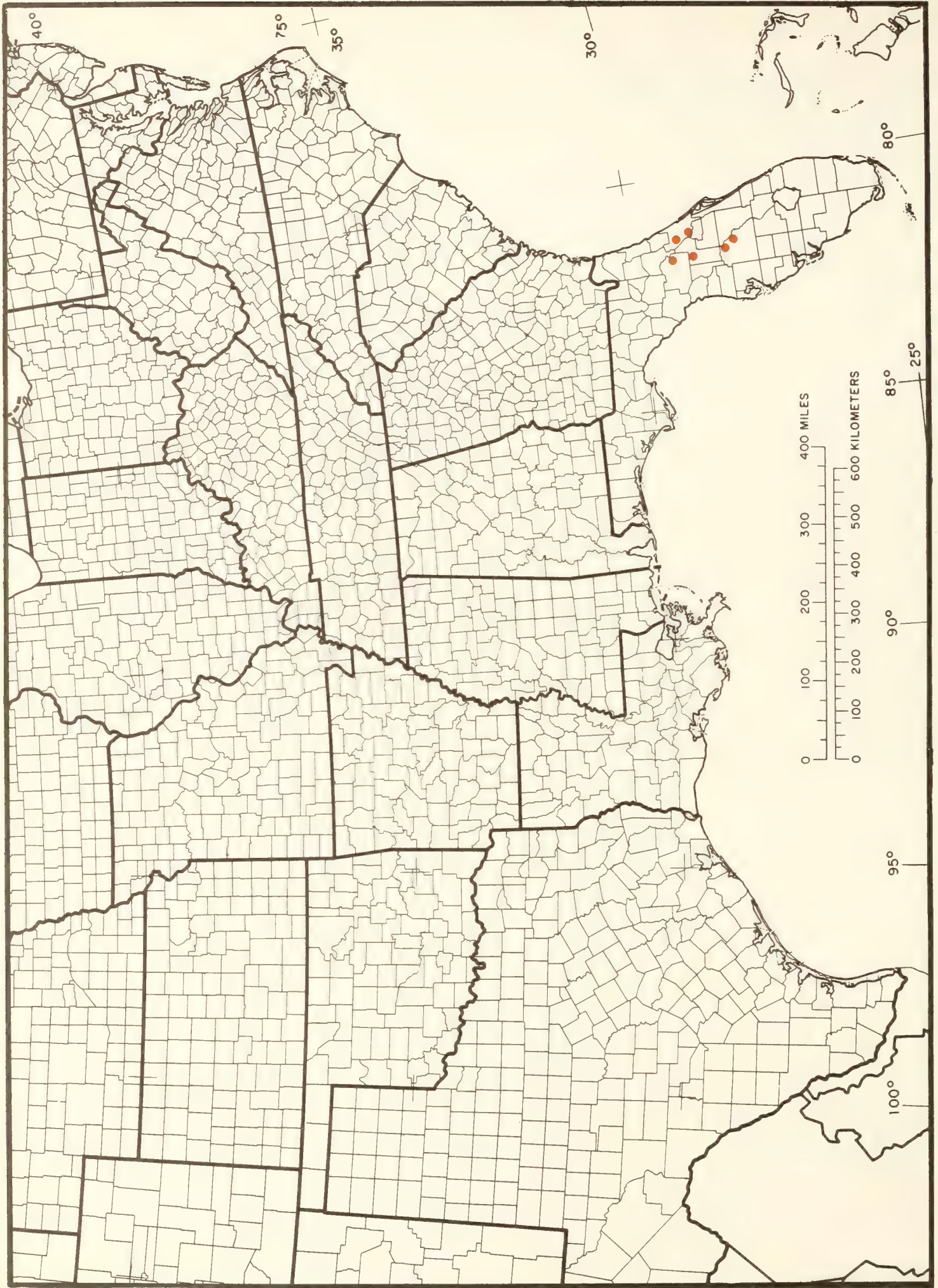
Map 71 SE. *Hex romitoria* Vitz. Yaupon.



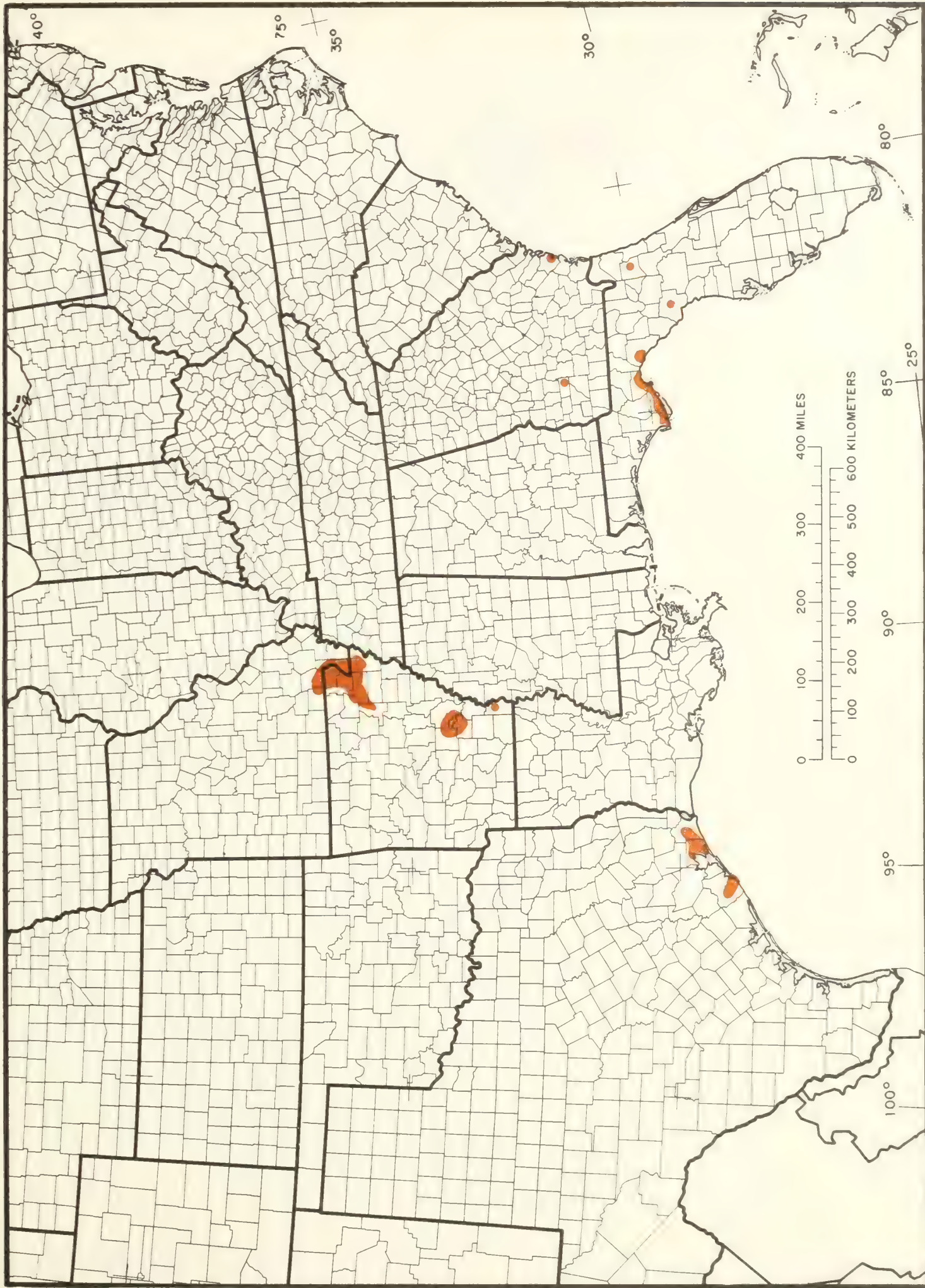
Map 72-N. *Illicium floridanum* Ellis, Florida anise-tree.



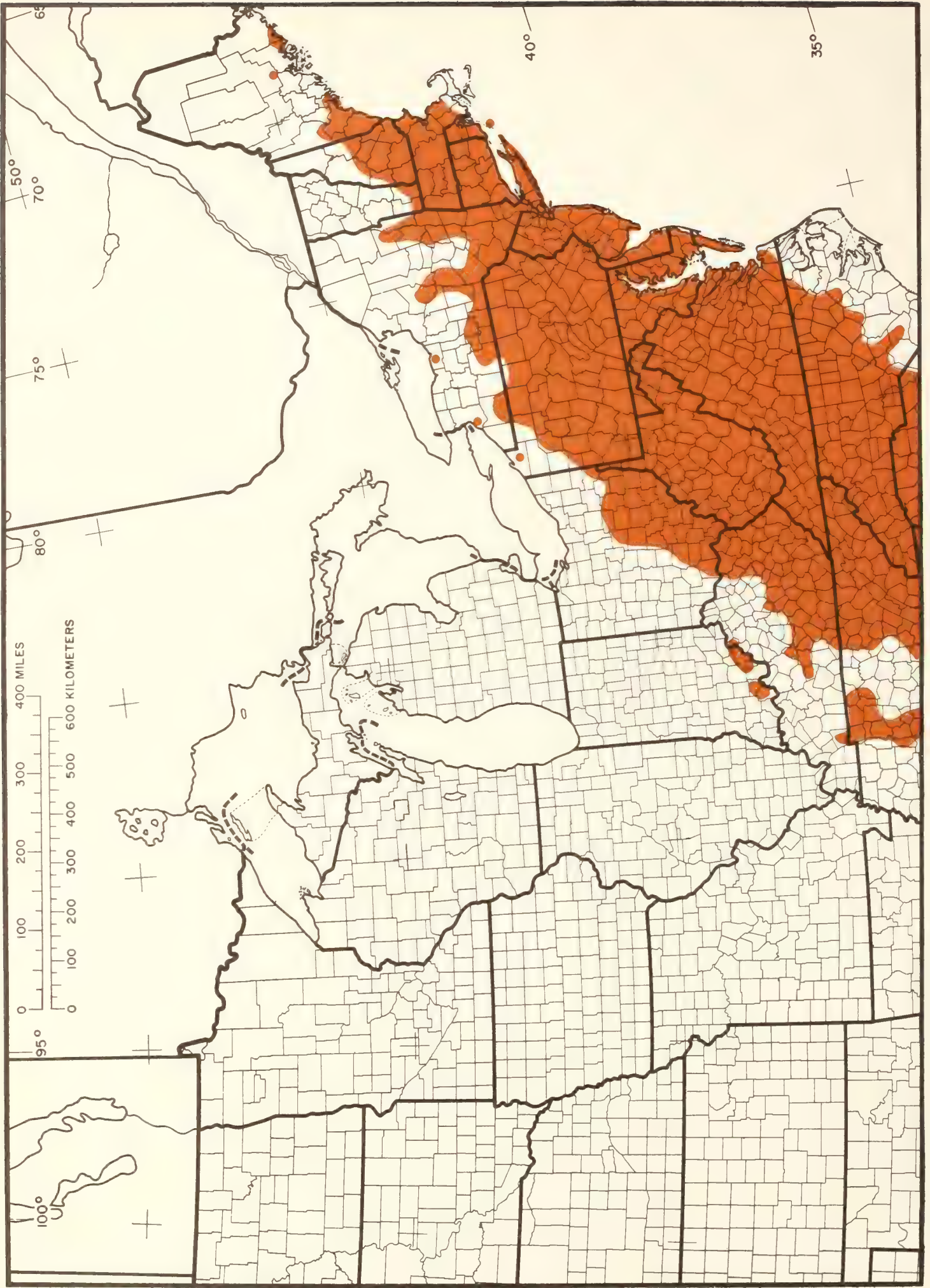
Map 72 NE. *Illicium floridanum* Ellis. Florida anise tree.



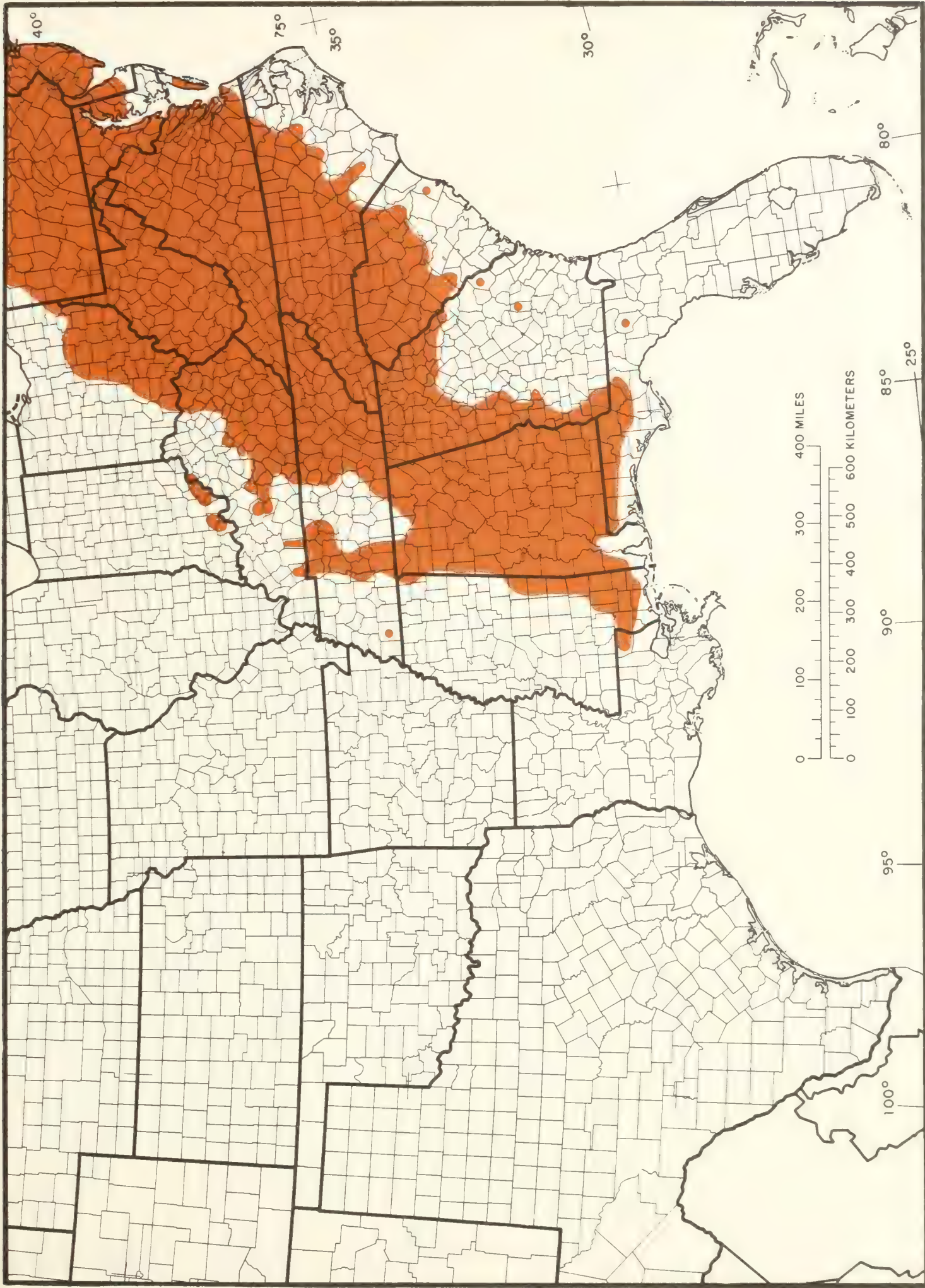
Map 73. *Illicium parviflorum* Michx., yellow anise-tree. Rare and local in c. Fla.



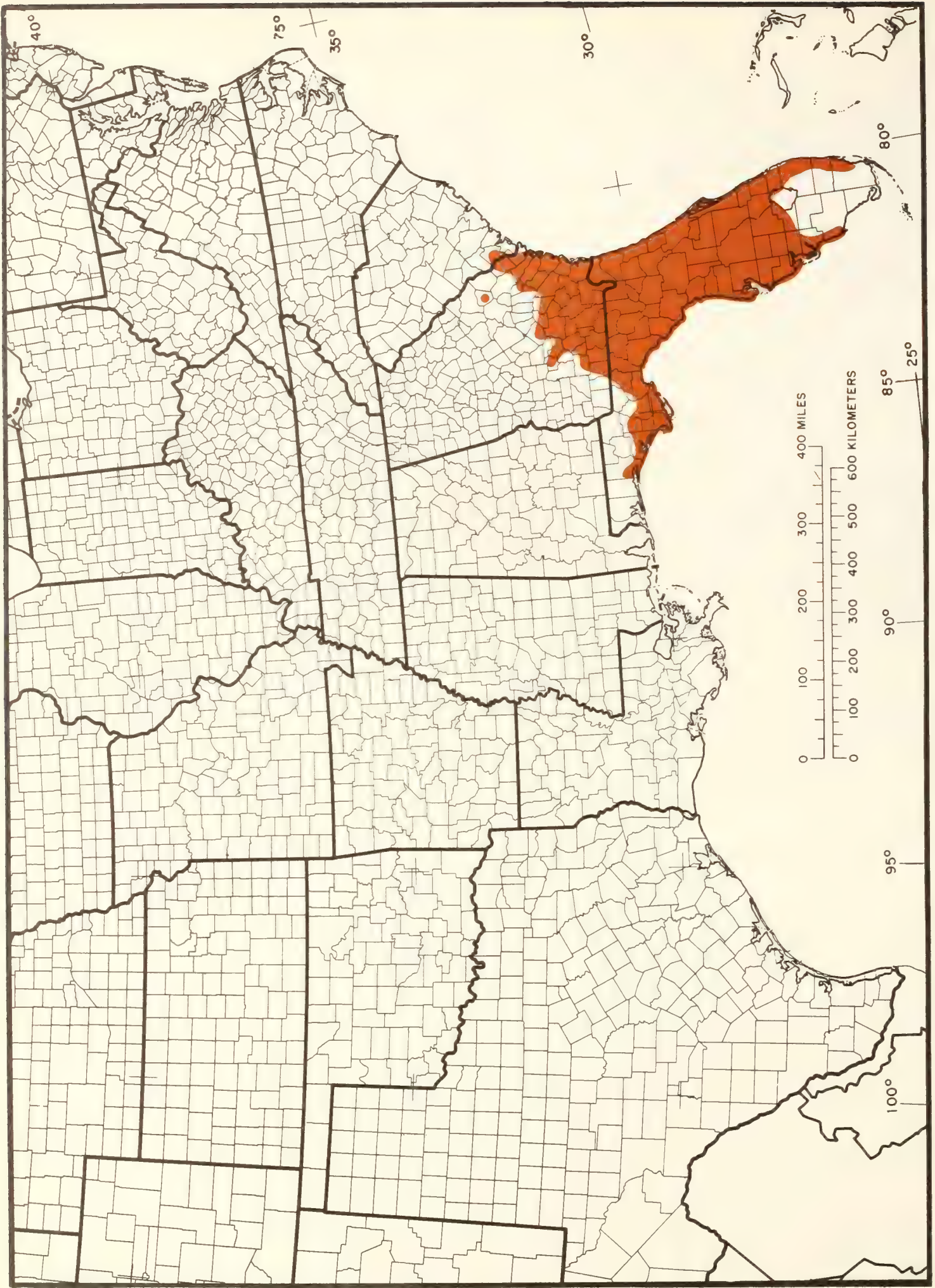
Map 74. *Letneria floridana* Chapm., corkwood.



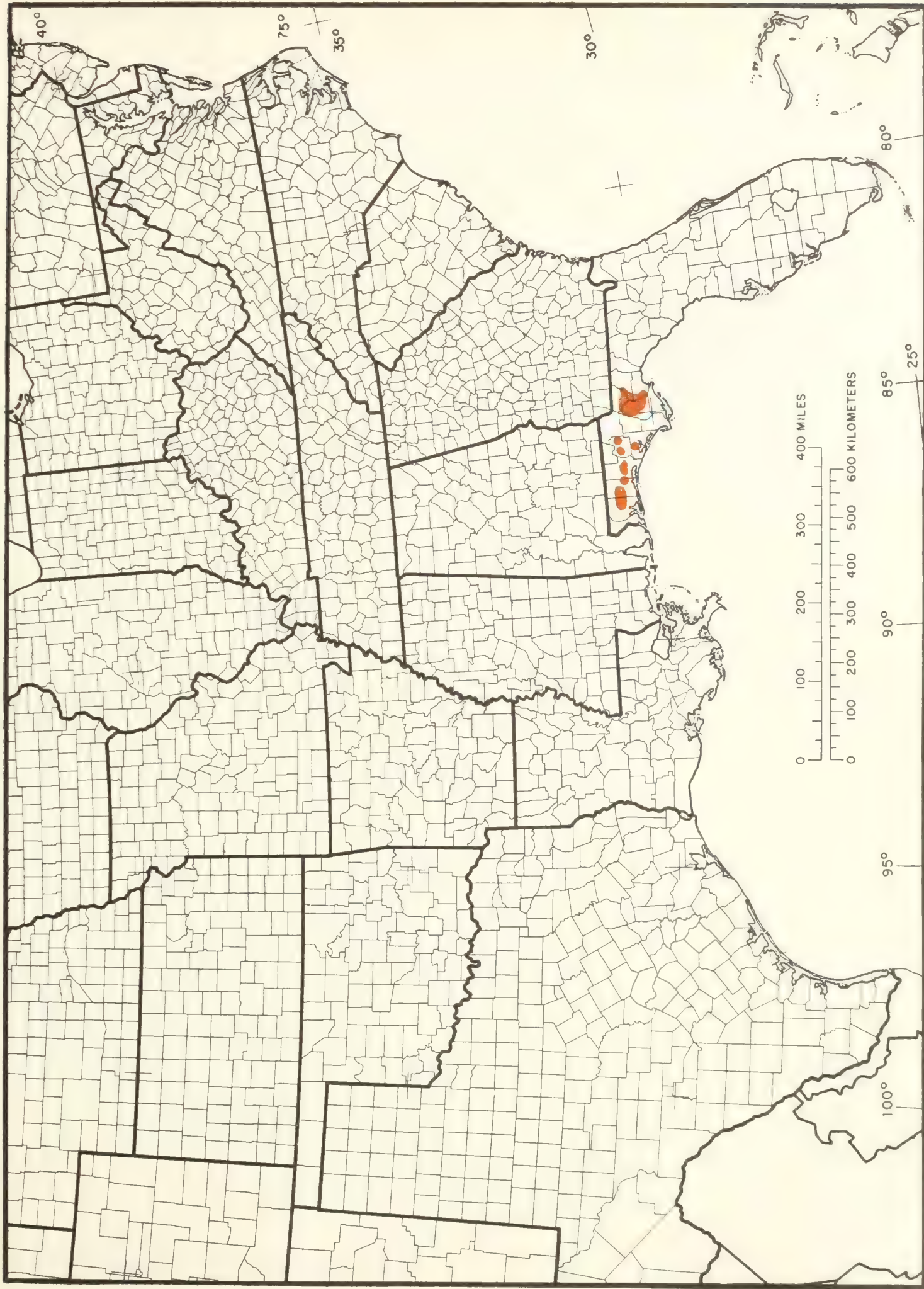
Map 75-NE. *Kalmia latifolia* L., mountain-laurel.



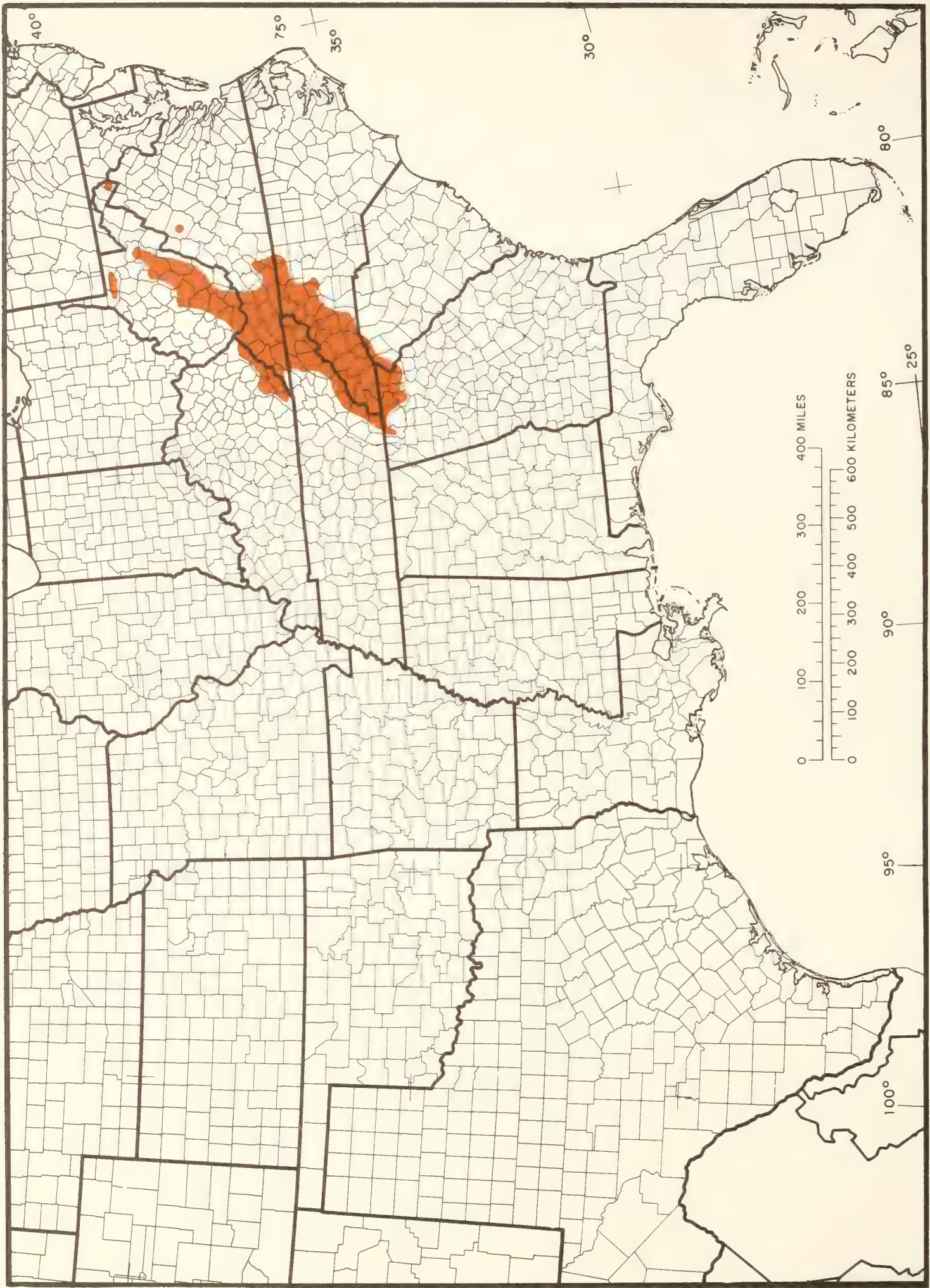
Map 75-SE. *Kalmia latifolia* L., mountain laurel.



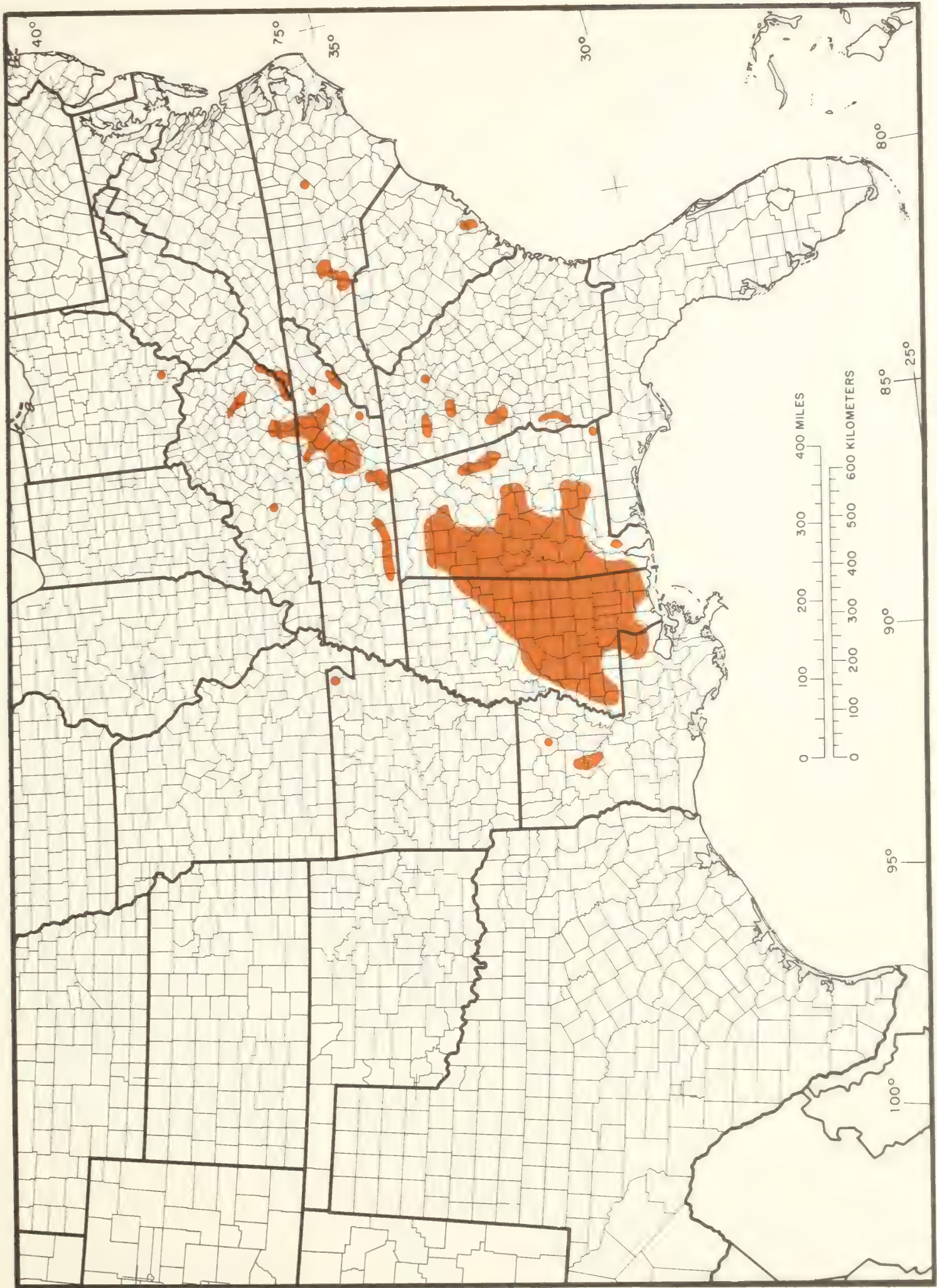
Map 76. *Lyonia ferruginea* Nutt., tree lyonia.



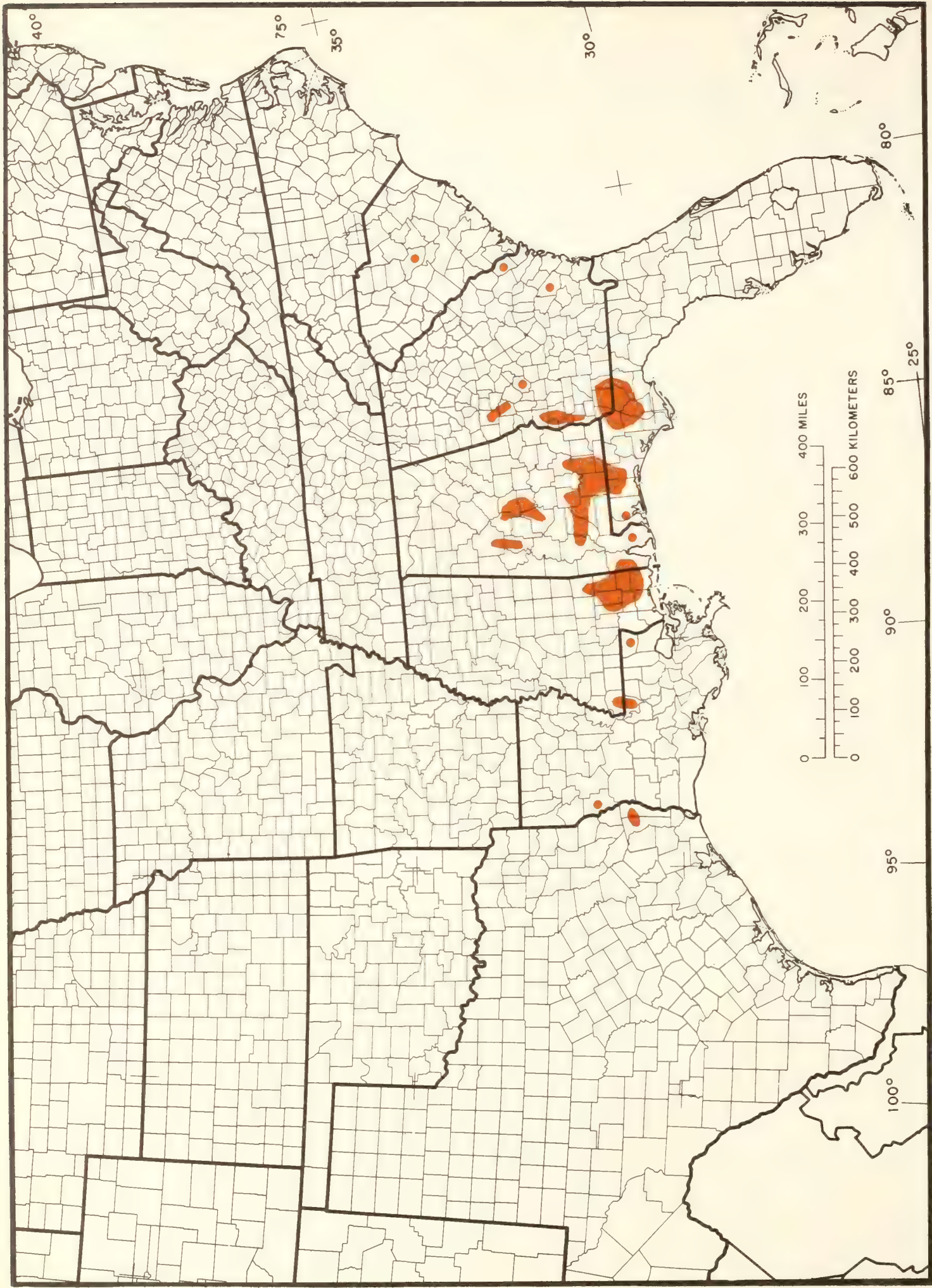
Map 77. *Magnolia ashei* Weatherby, *Ashe magnolia*. Local in nw. Fla.



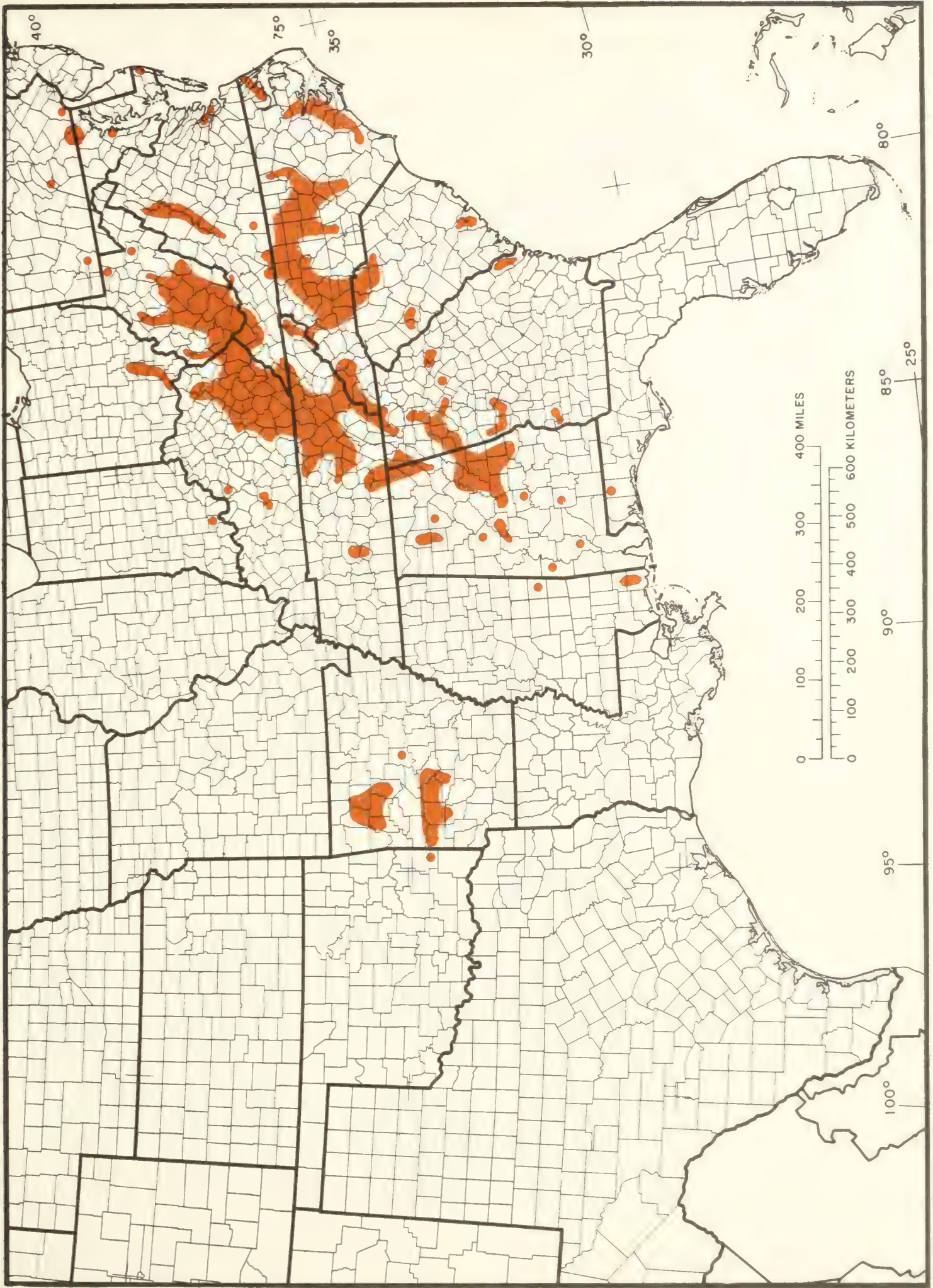
Map 78. *Magnolia fraseri* Walt., *Fraser magnolia*.



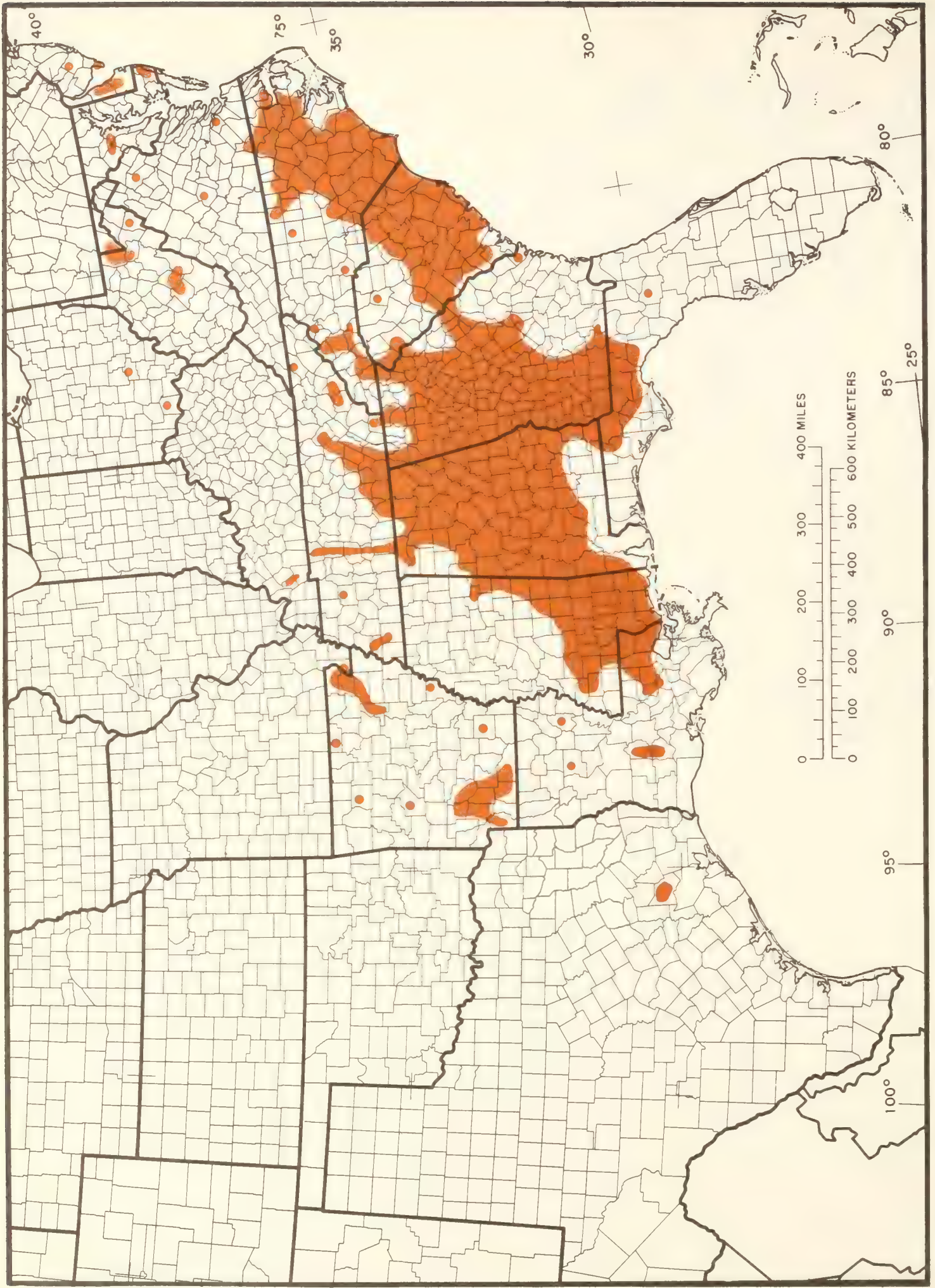
Map 79. *Magnolia macrophylla* Michx., bigleaf magnolia.



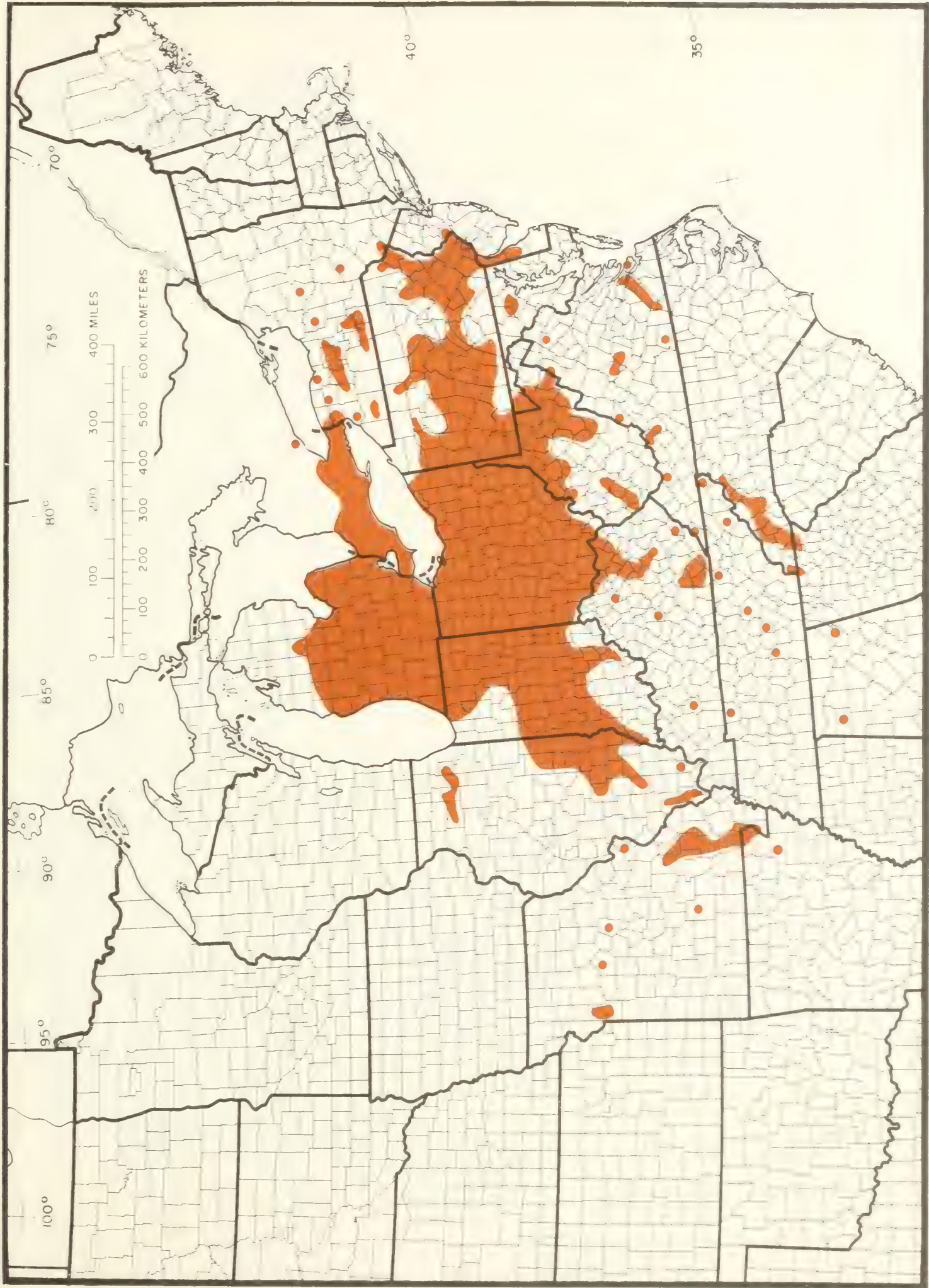
Map 80. *Magnolia pyramidata* Bart., pyramid magnolia.



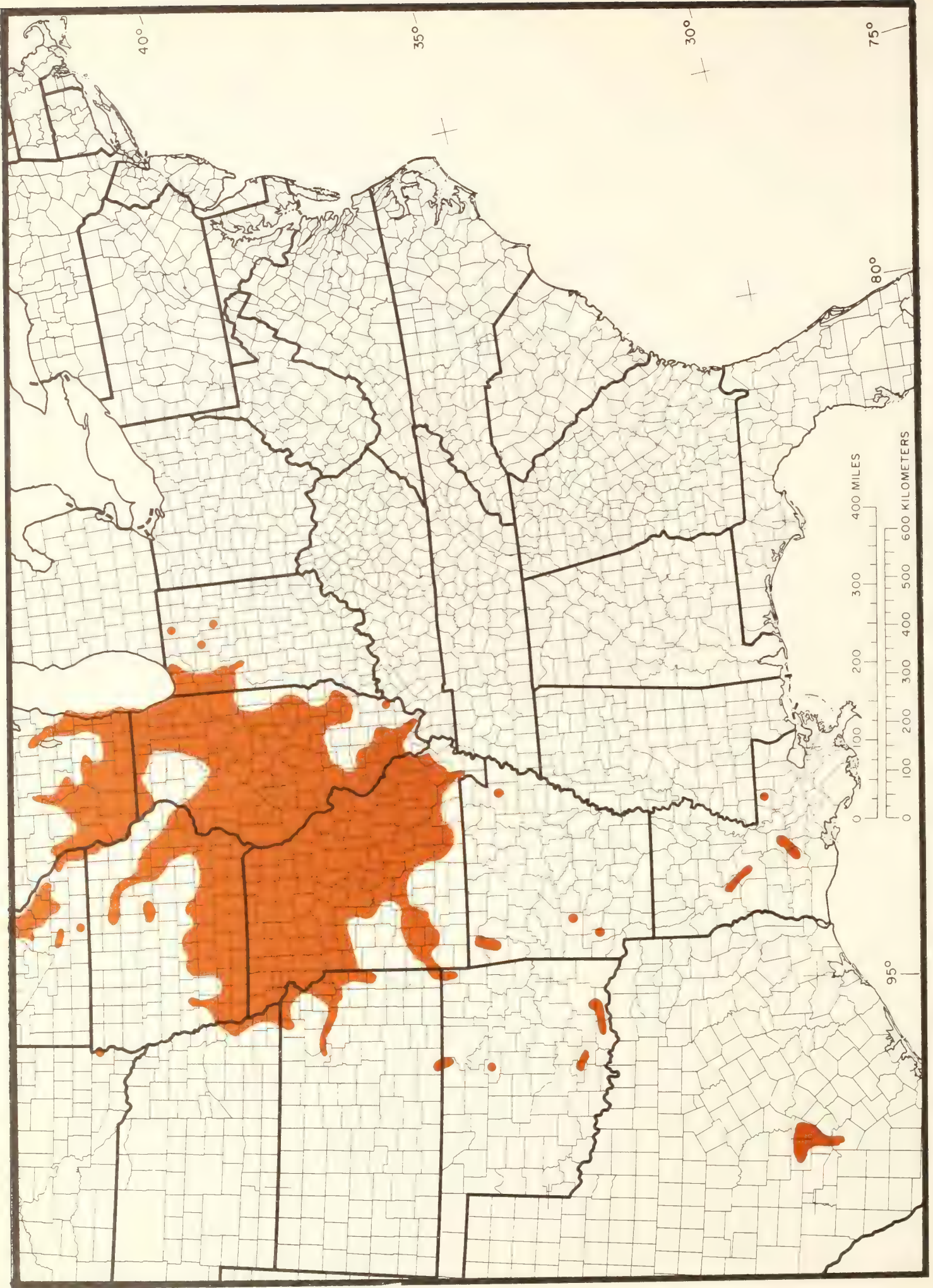
Map 81. *Magnolia tripetala* L., umbrella magnolia.



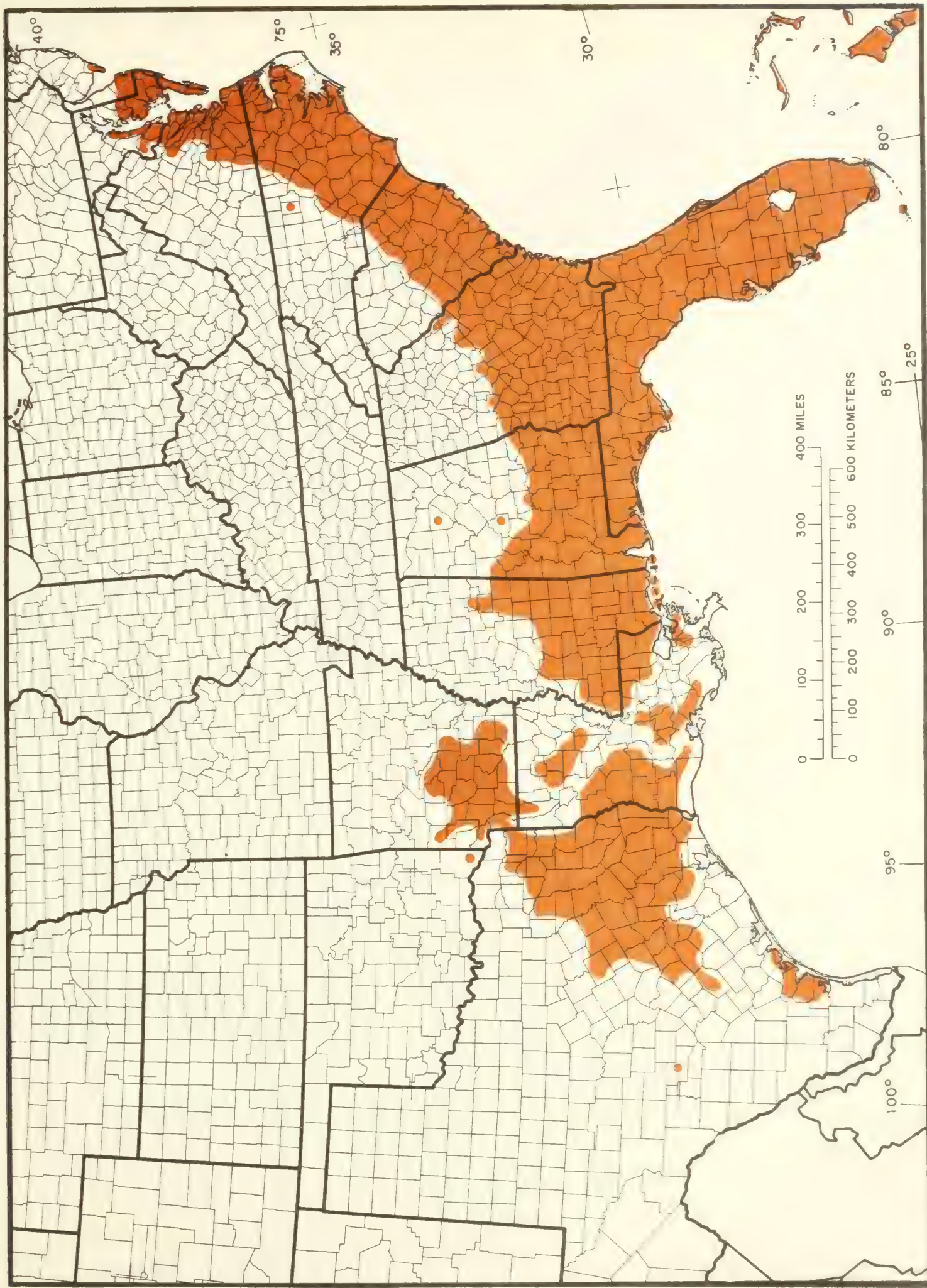
Map 82. *Malus angustifolia* (Ait.) Michx., southern crab apple.



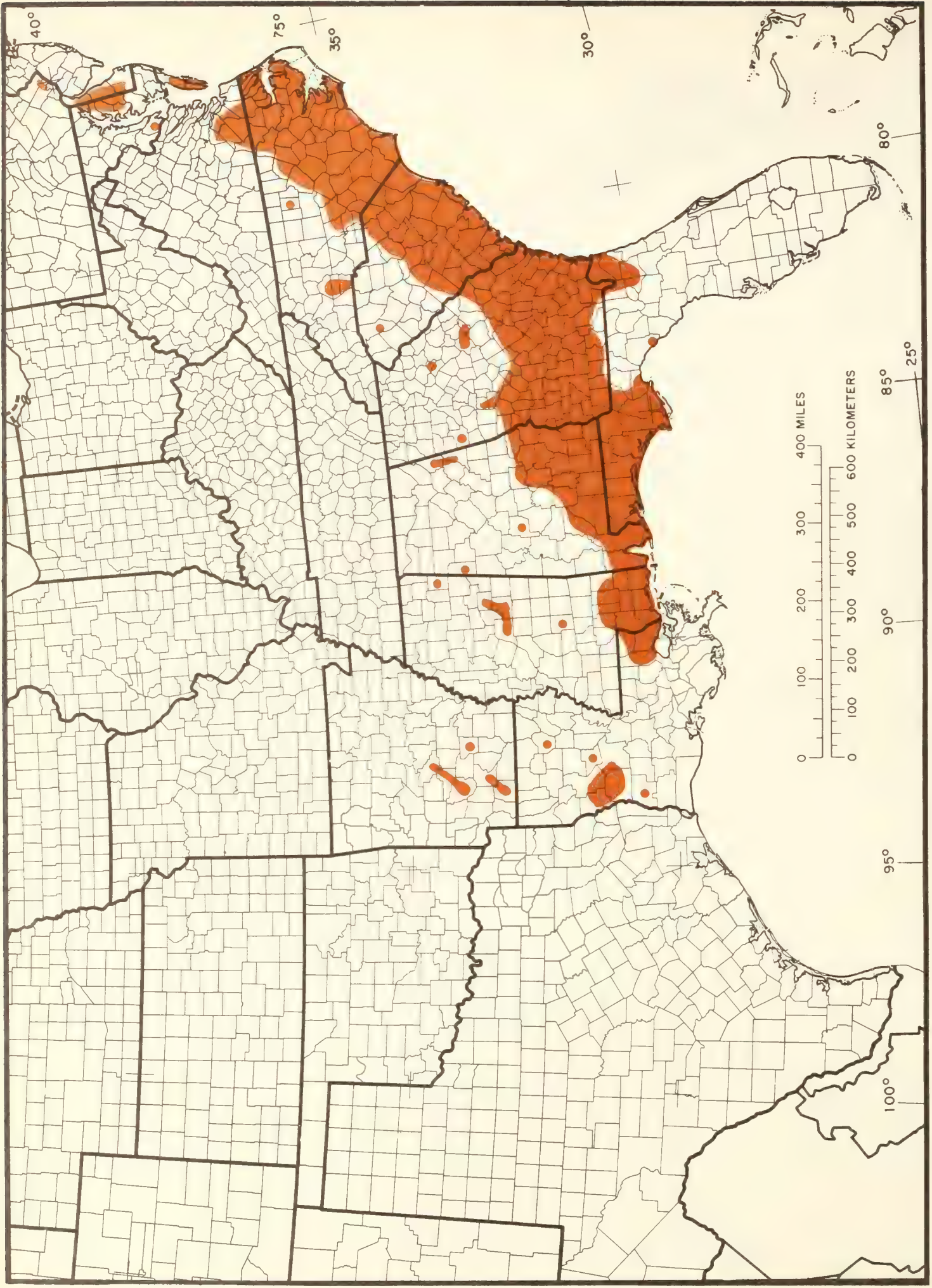
Map 83. *Malus coronaria* (L.) Mill., sweet crab apple.



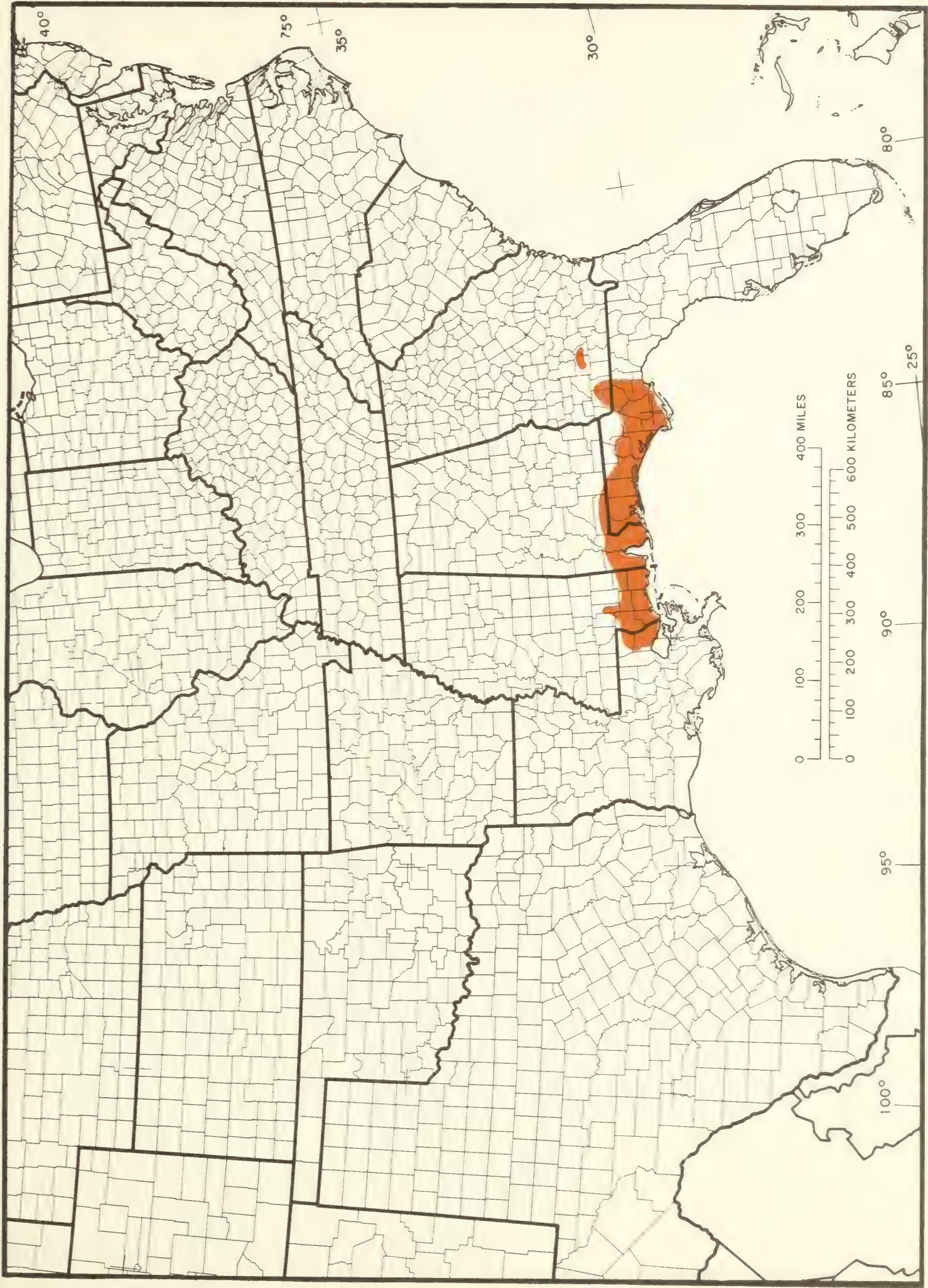
Map 84. *Malus ioensis* (Wood) Britton, prairie crab apple.



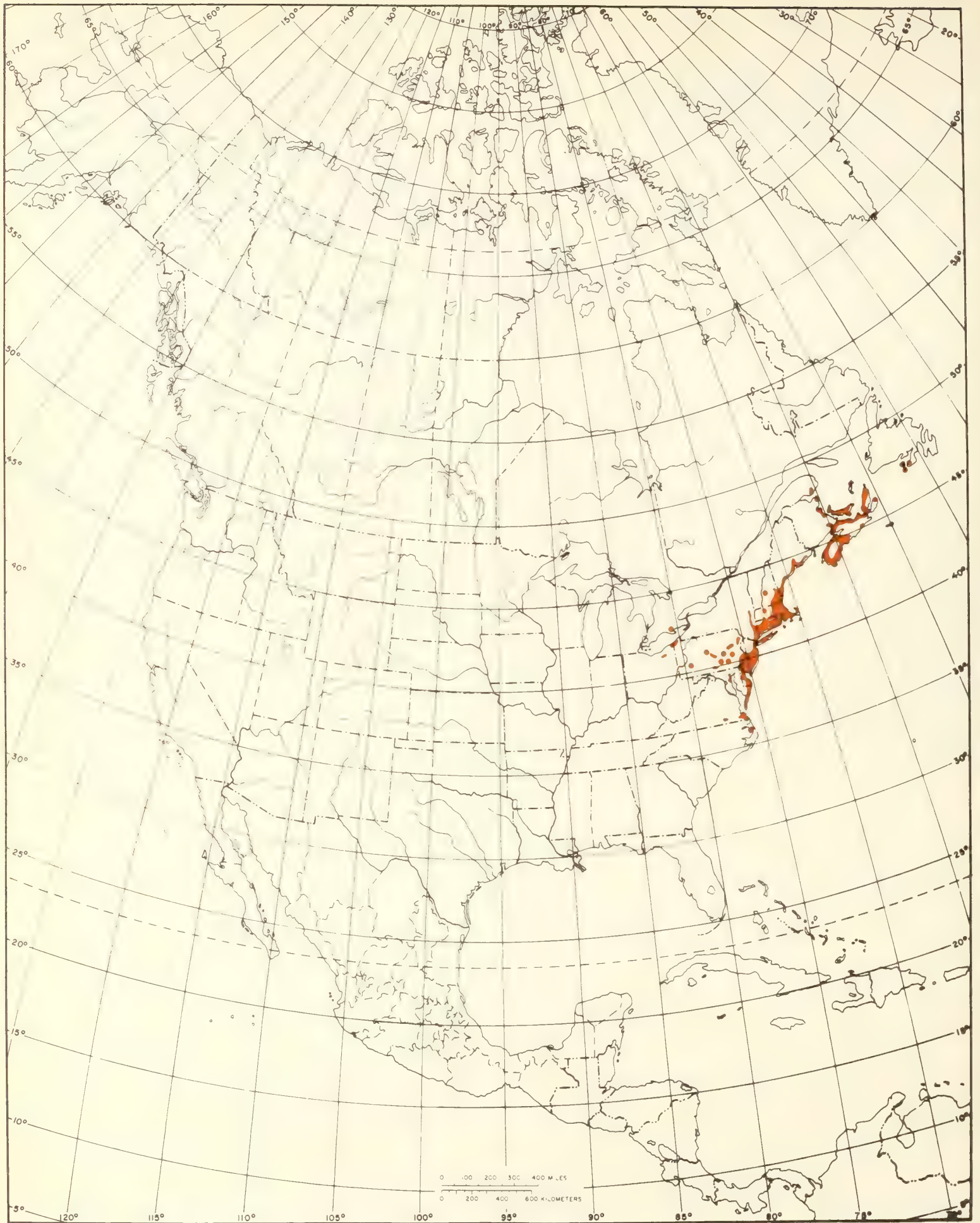
Map 85. *Myrica cerifera* L., southern bayberry. Also Bermuda, Bahamas, Cuba, Hispaniola, and P. R. and Mex. and C. Am. from Belize s. to Costa Rica.



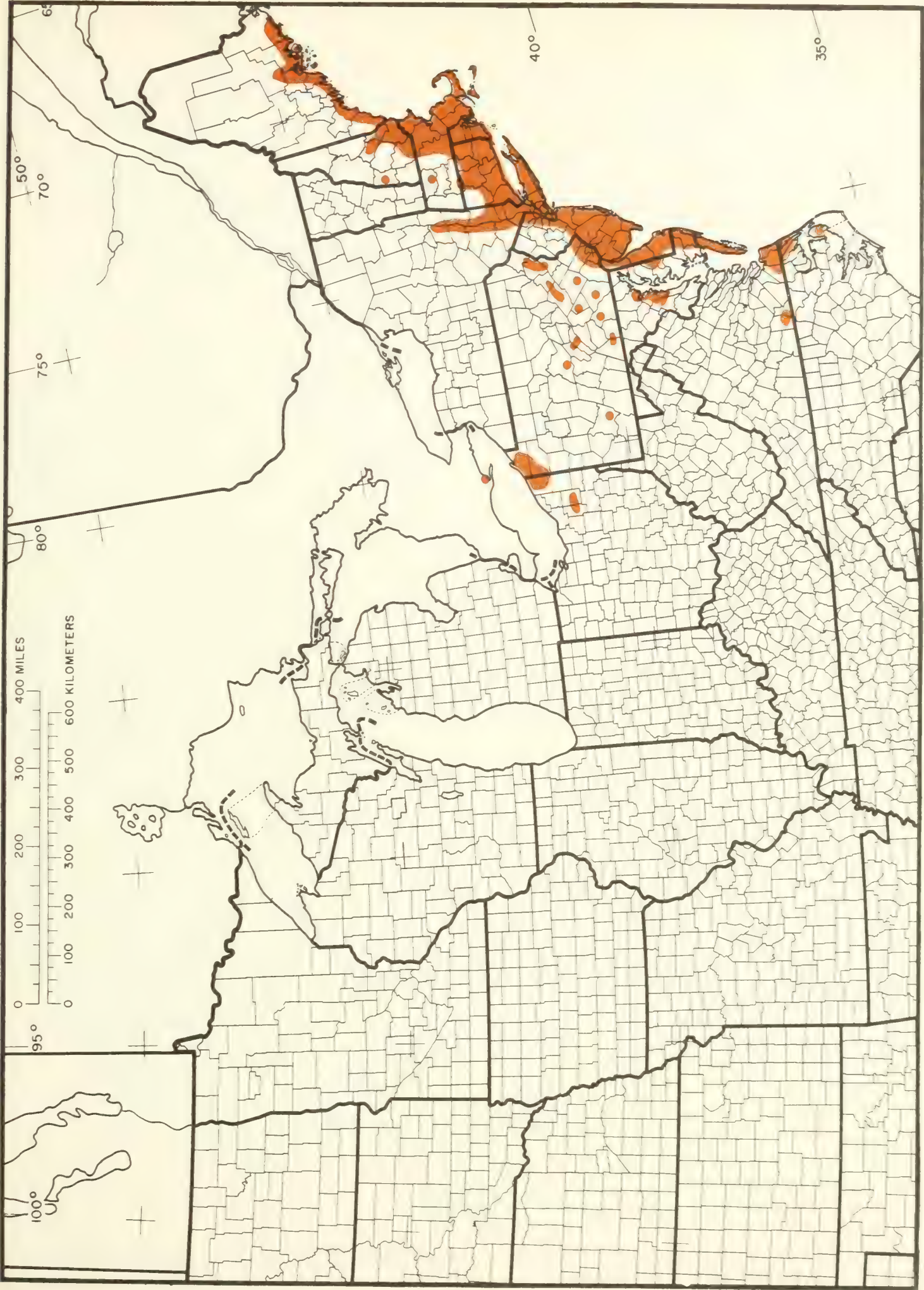
Map 86. *Myrica heterophylla* Raf., evergreen bayberry.



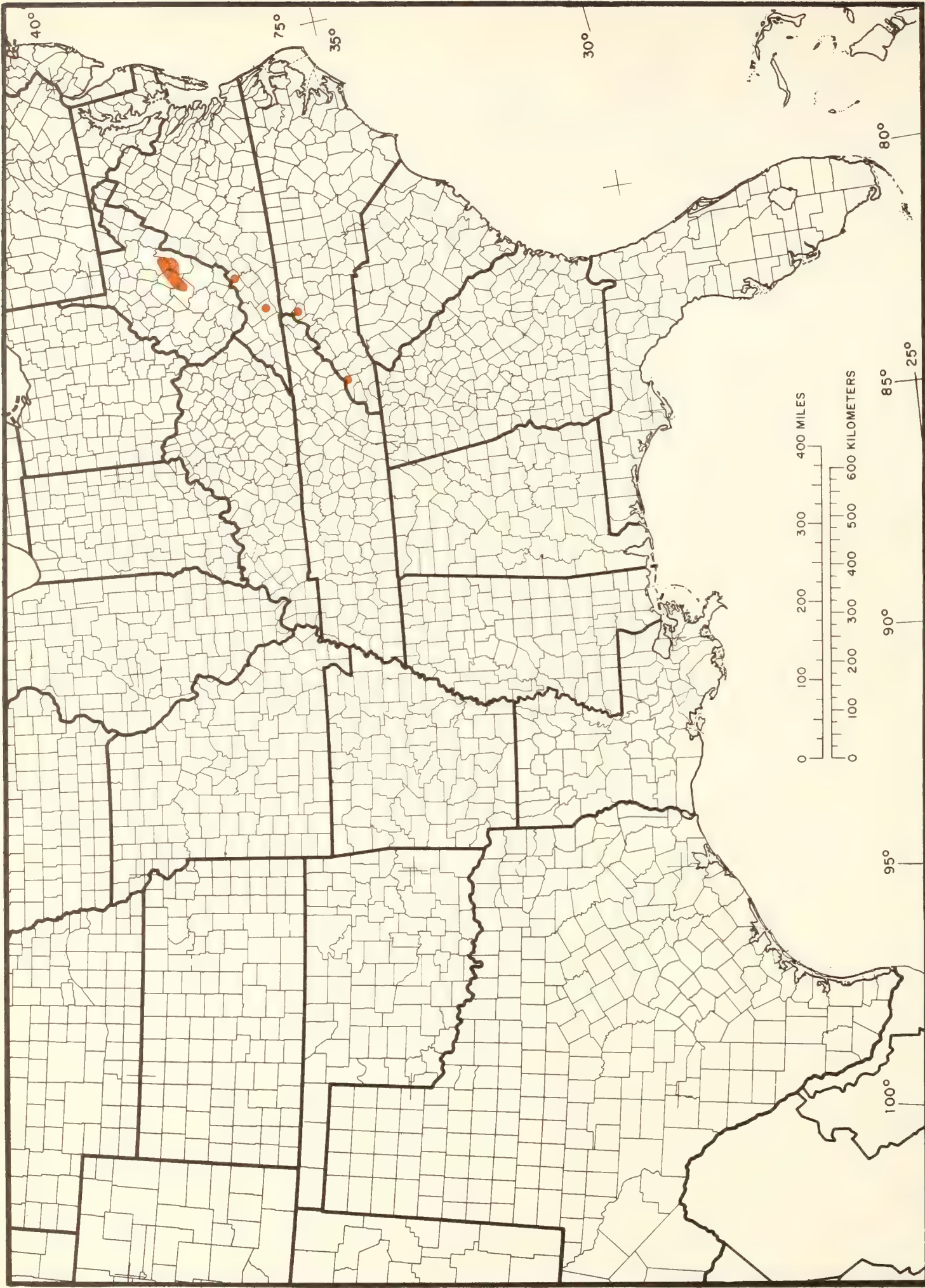
Map 87. *Myrica inodora* (L.) Bart., odorless bayberry.



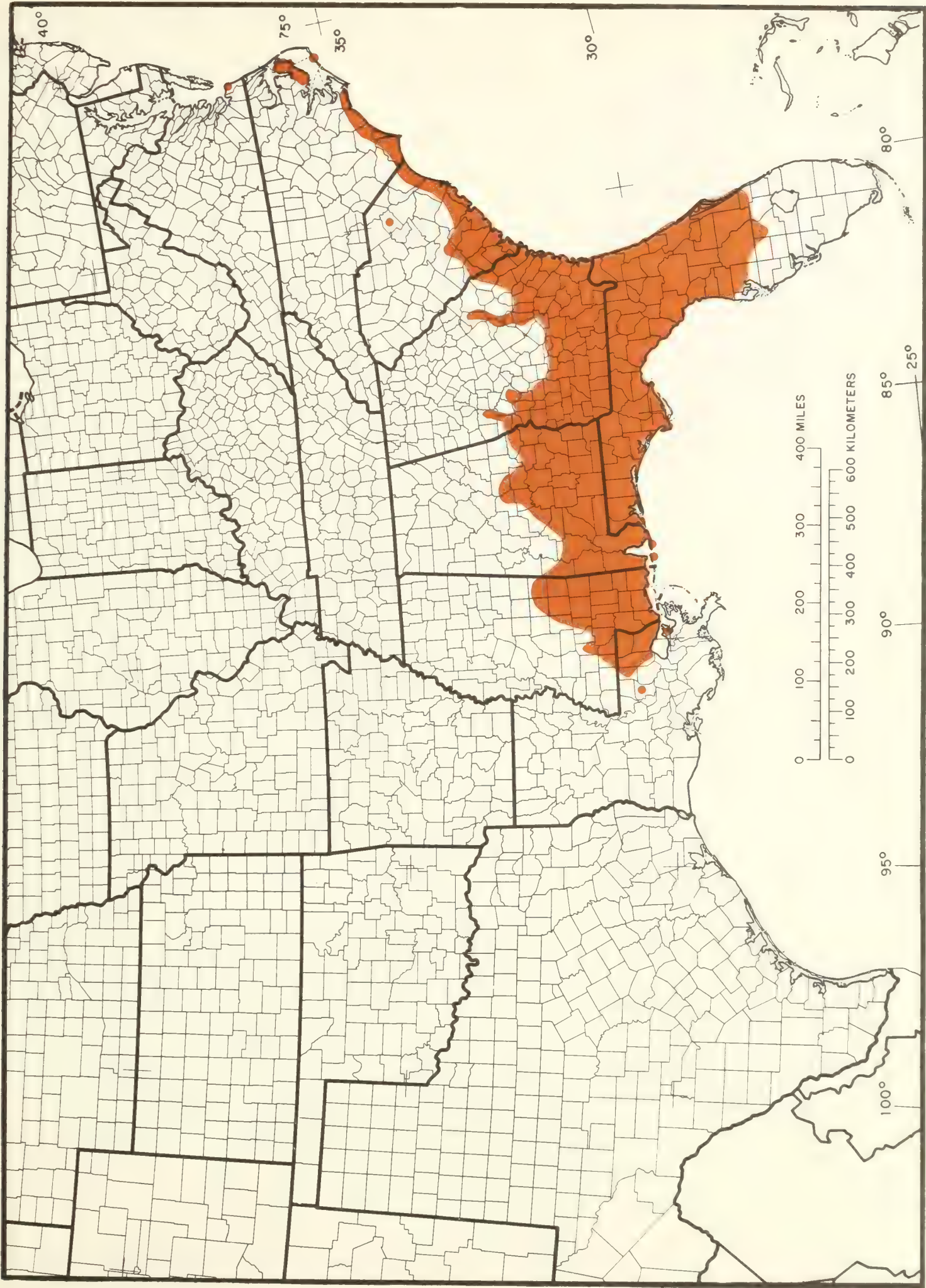
Map 88-N. *Myrica pensylvanica* Loisel., northern bayberry.



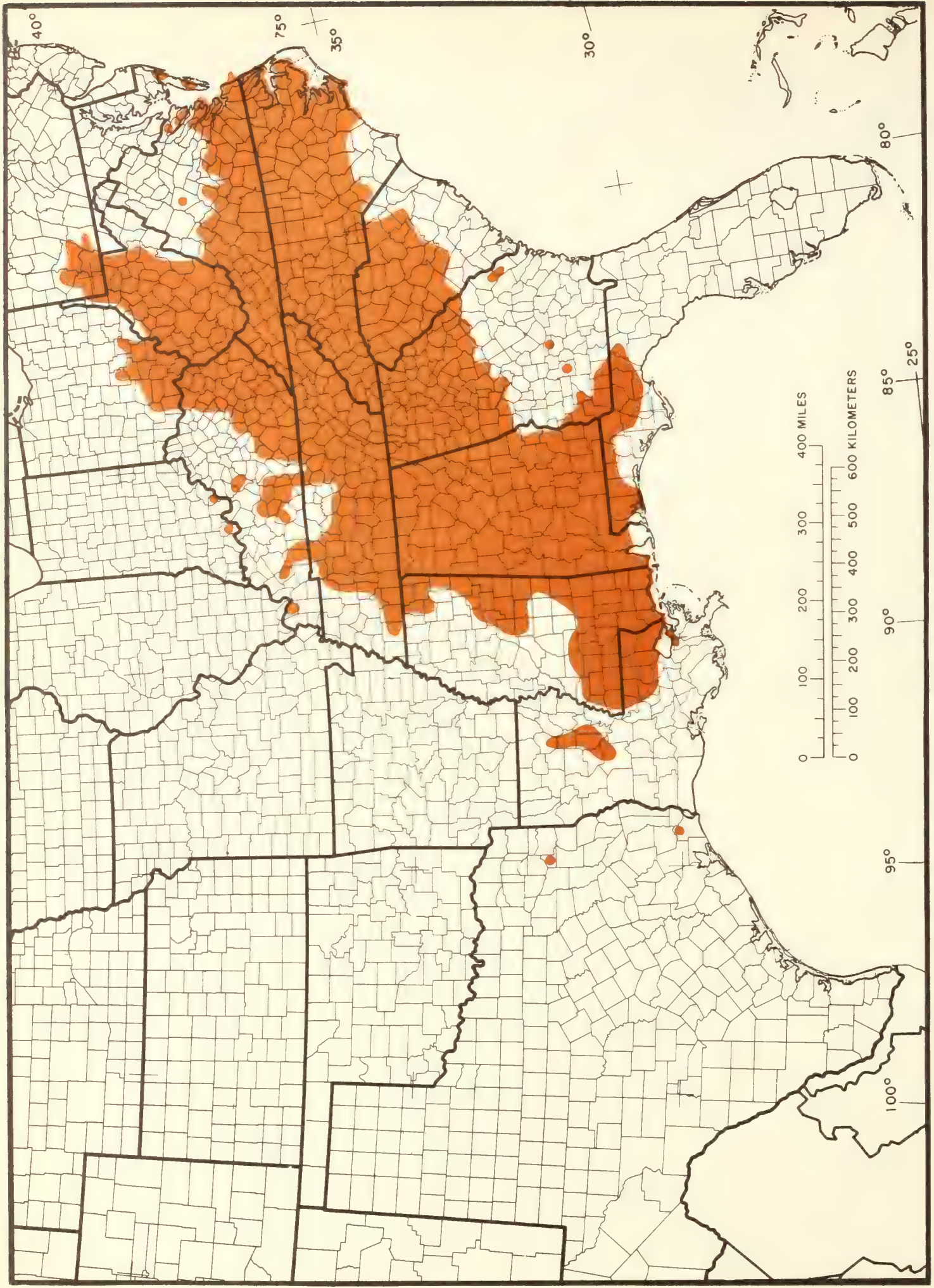
Map 483 NE. *Myrica pensylvanica* Loisel., northern bayberry.



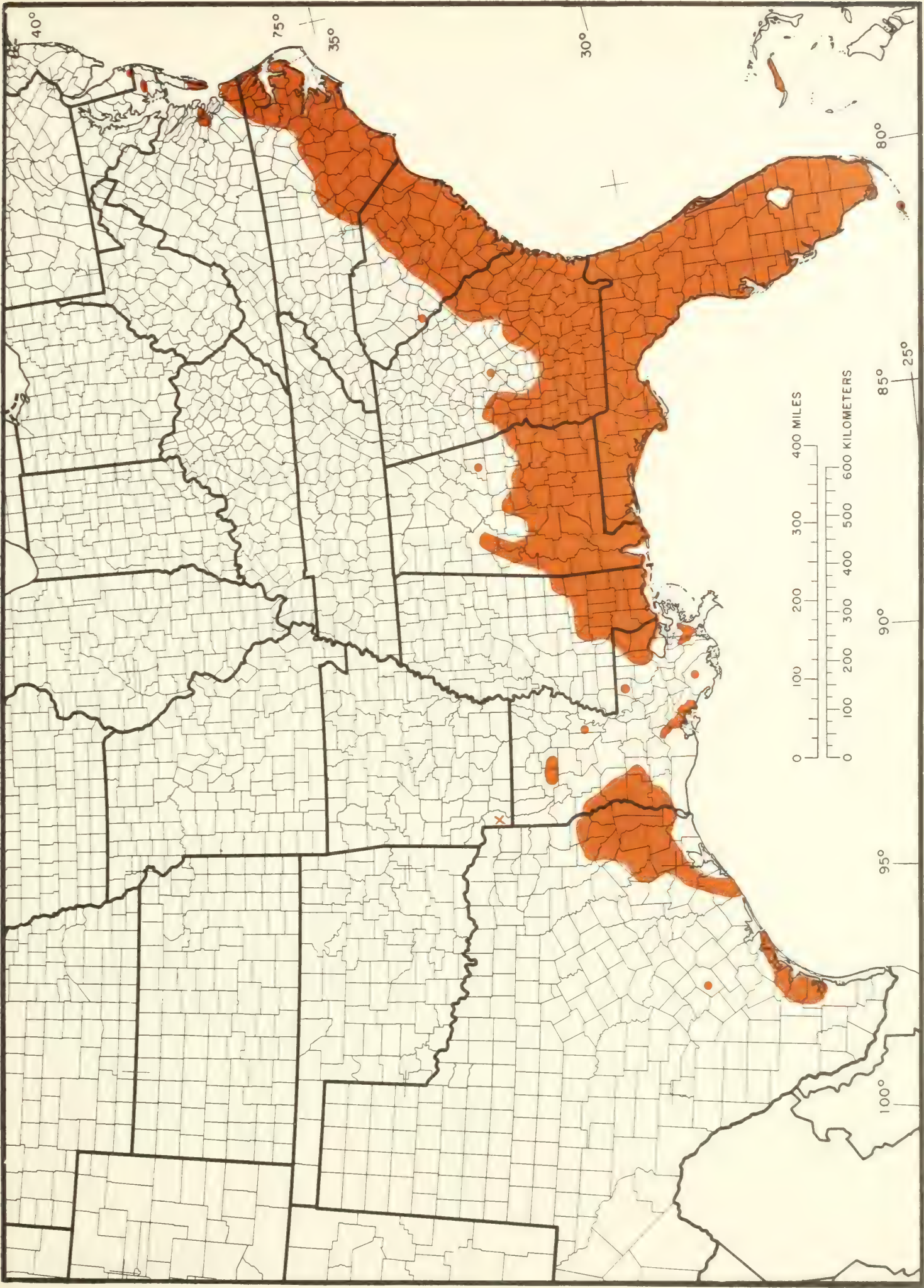
Map 89. *Nemopanthus collinus* (Alexander) R. C. Clark, mountain-holly. Rare and local in mts. of e. W. Va., sw. Va., and w. N. C.



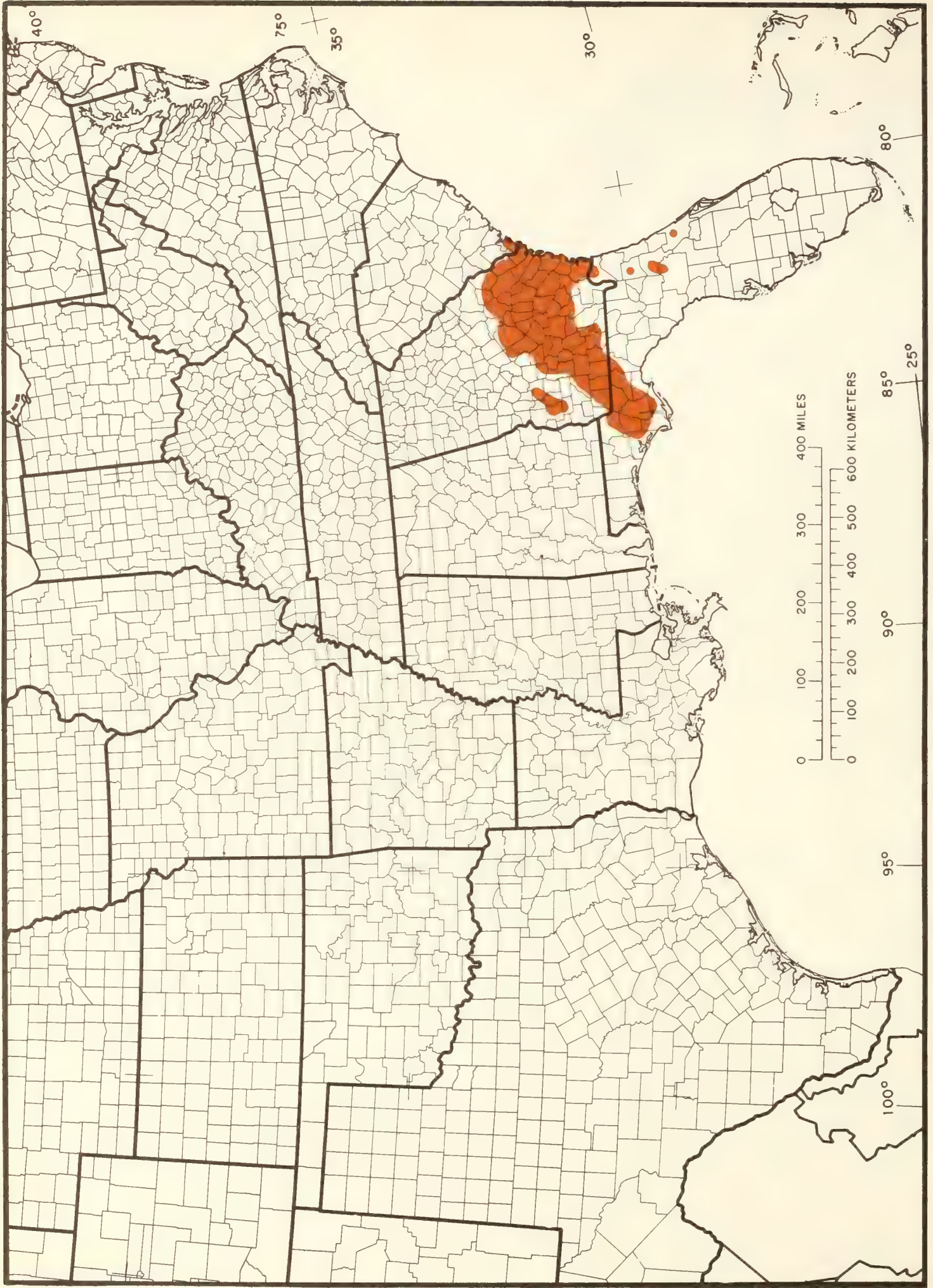
Map 90. *Osmanthus americanus* (L.) Benth. & Hook. f., devilwood. Also Mex. (N. L., Tamp., Ver., Oax.)



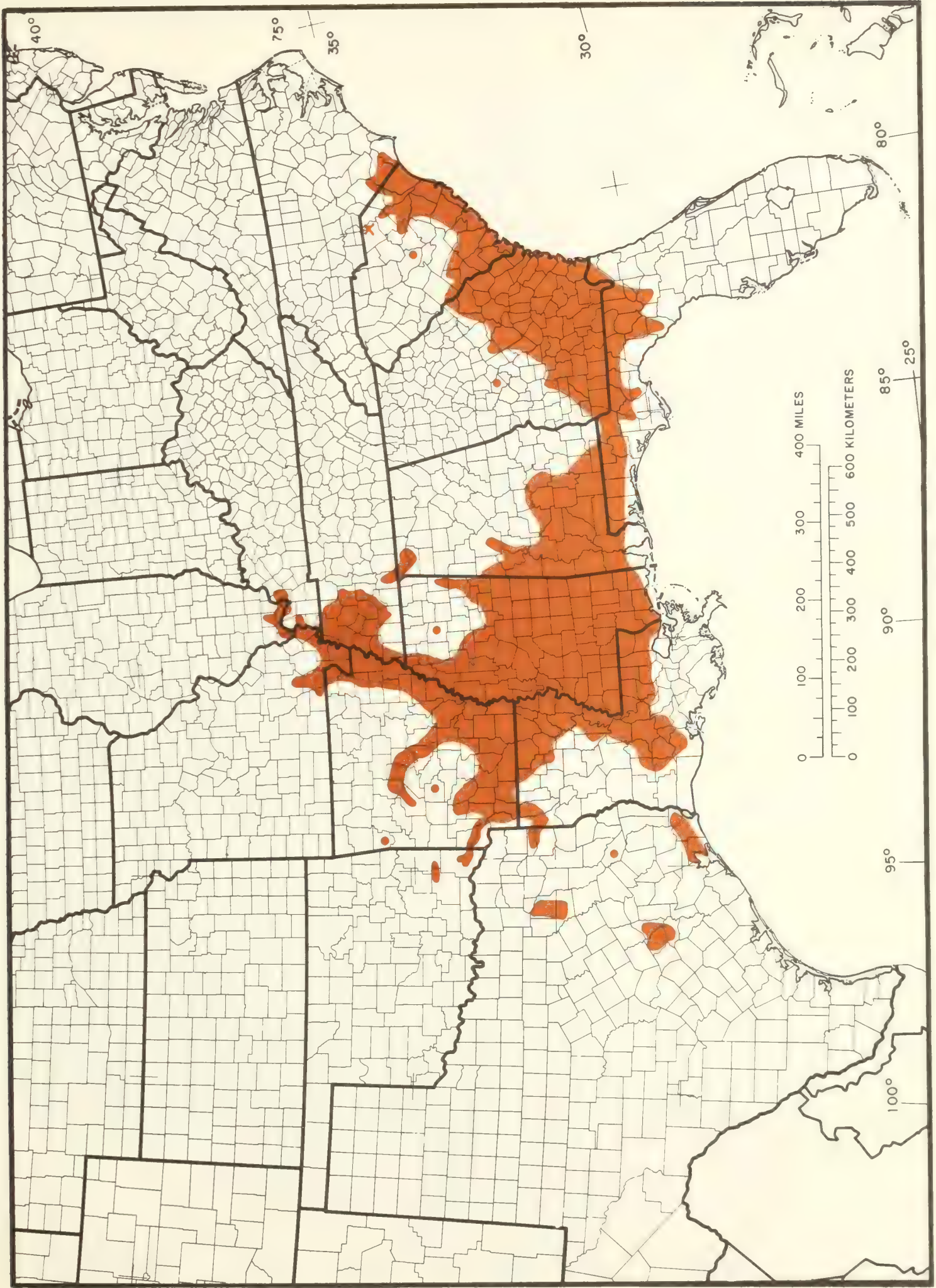
Map 91. *Oxydendrum arboreum* (L.) DC., sourwood.



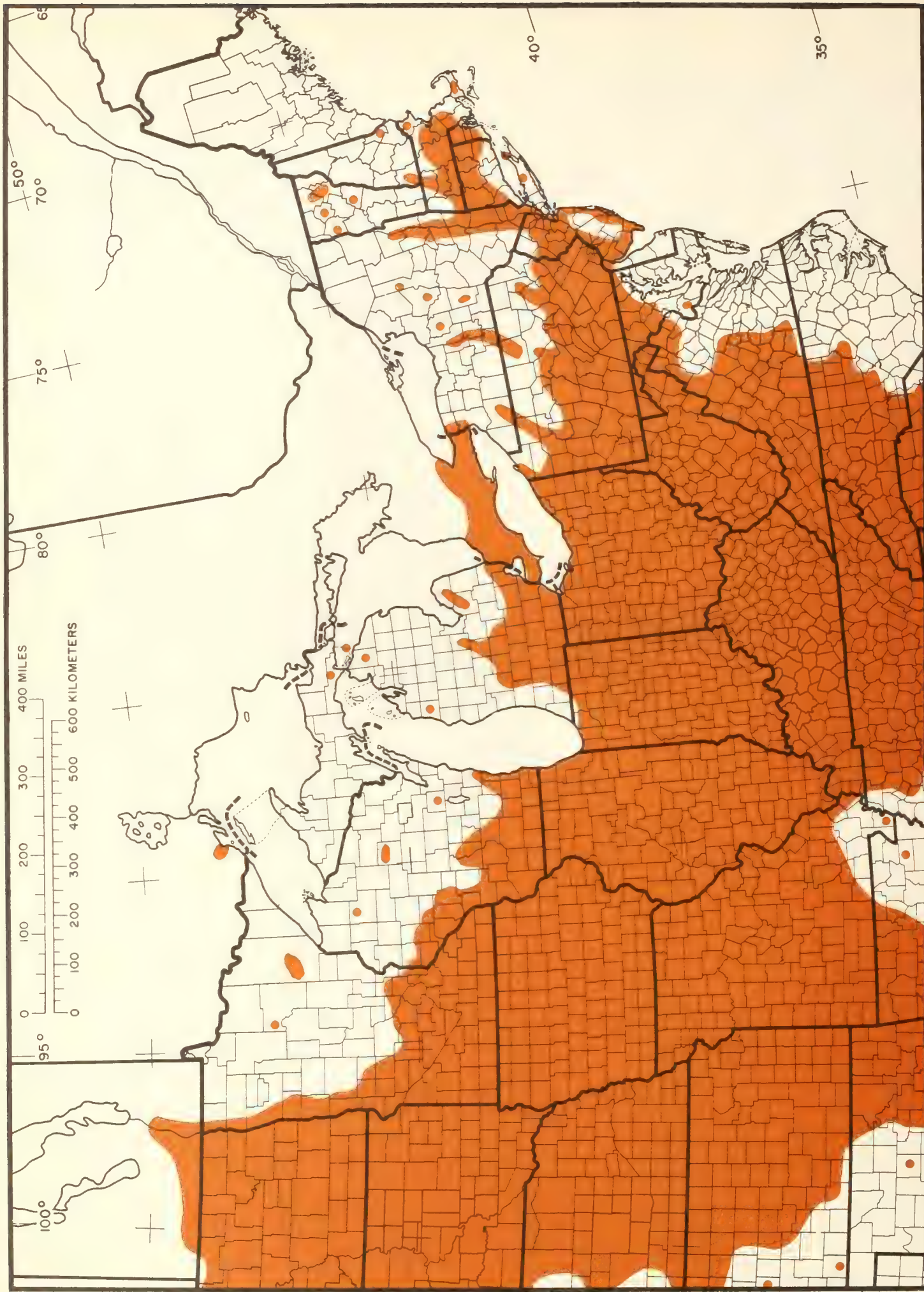
Map 92. *Persca borbonica* (L.) Spreng., redbay.



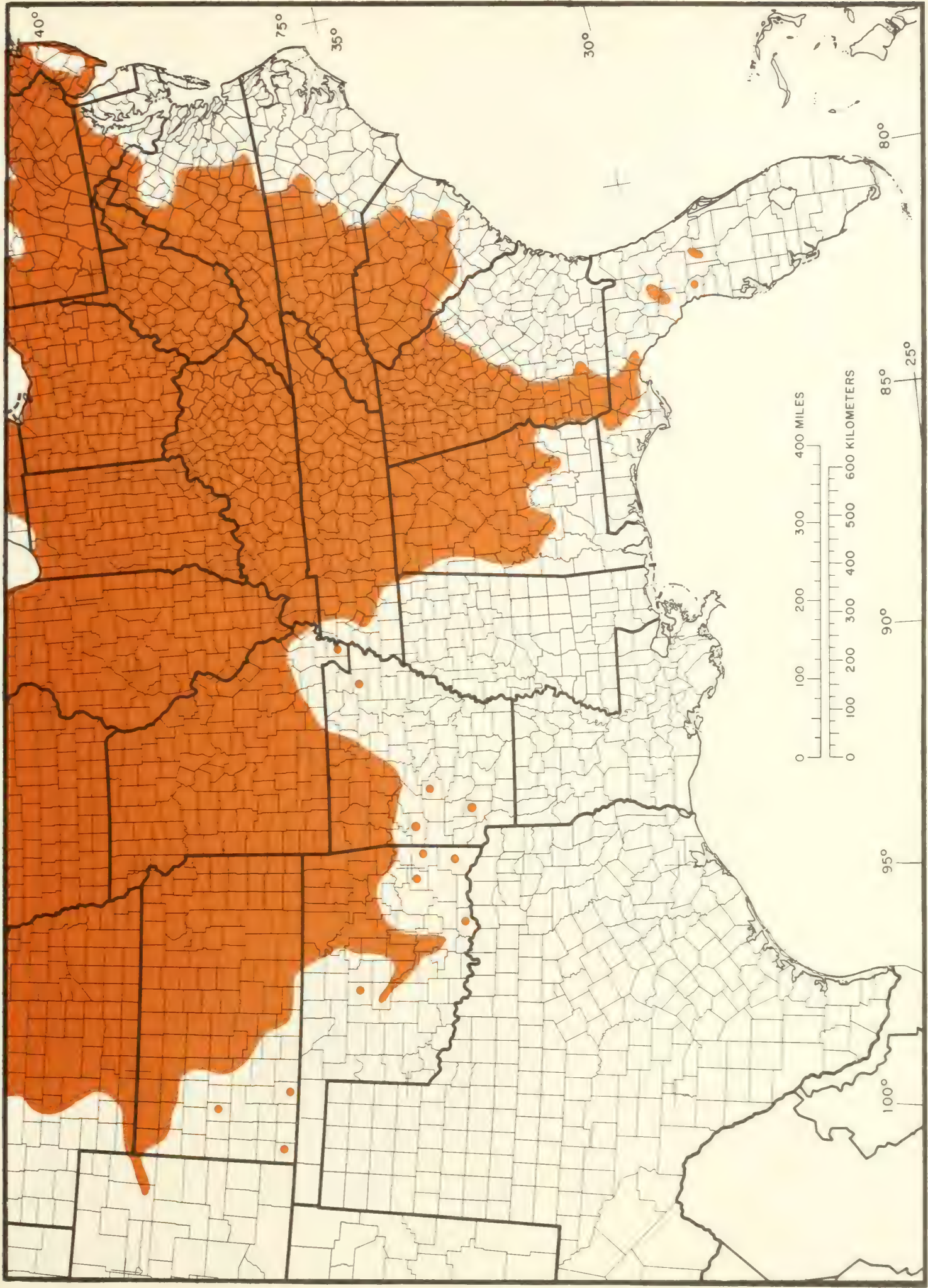
Map 93. *Pinckneya pubens* Michx., pinckneya.



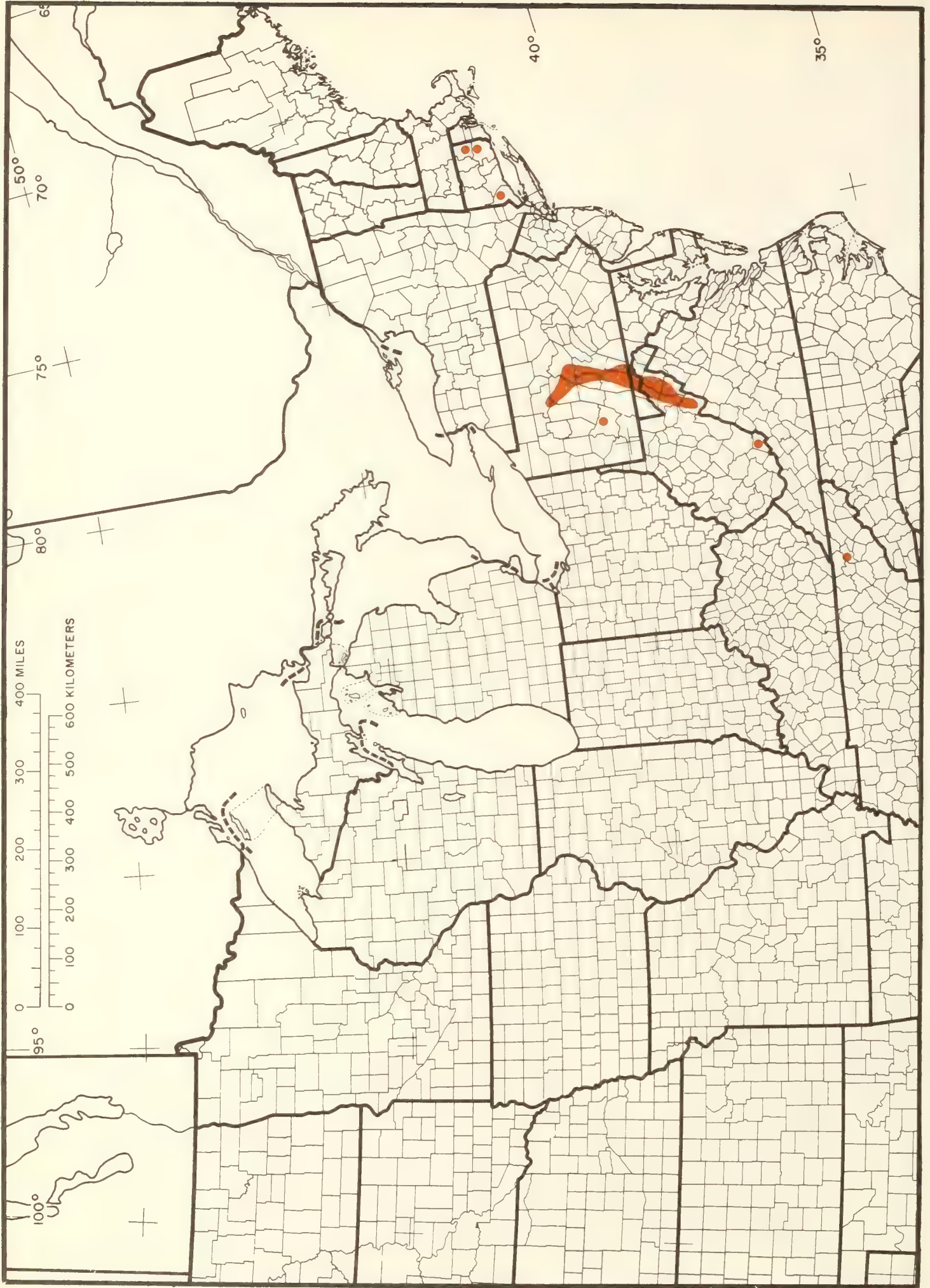
Map 91. *Planera aquatica* J. F. Gmel., planer tree.



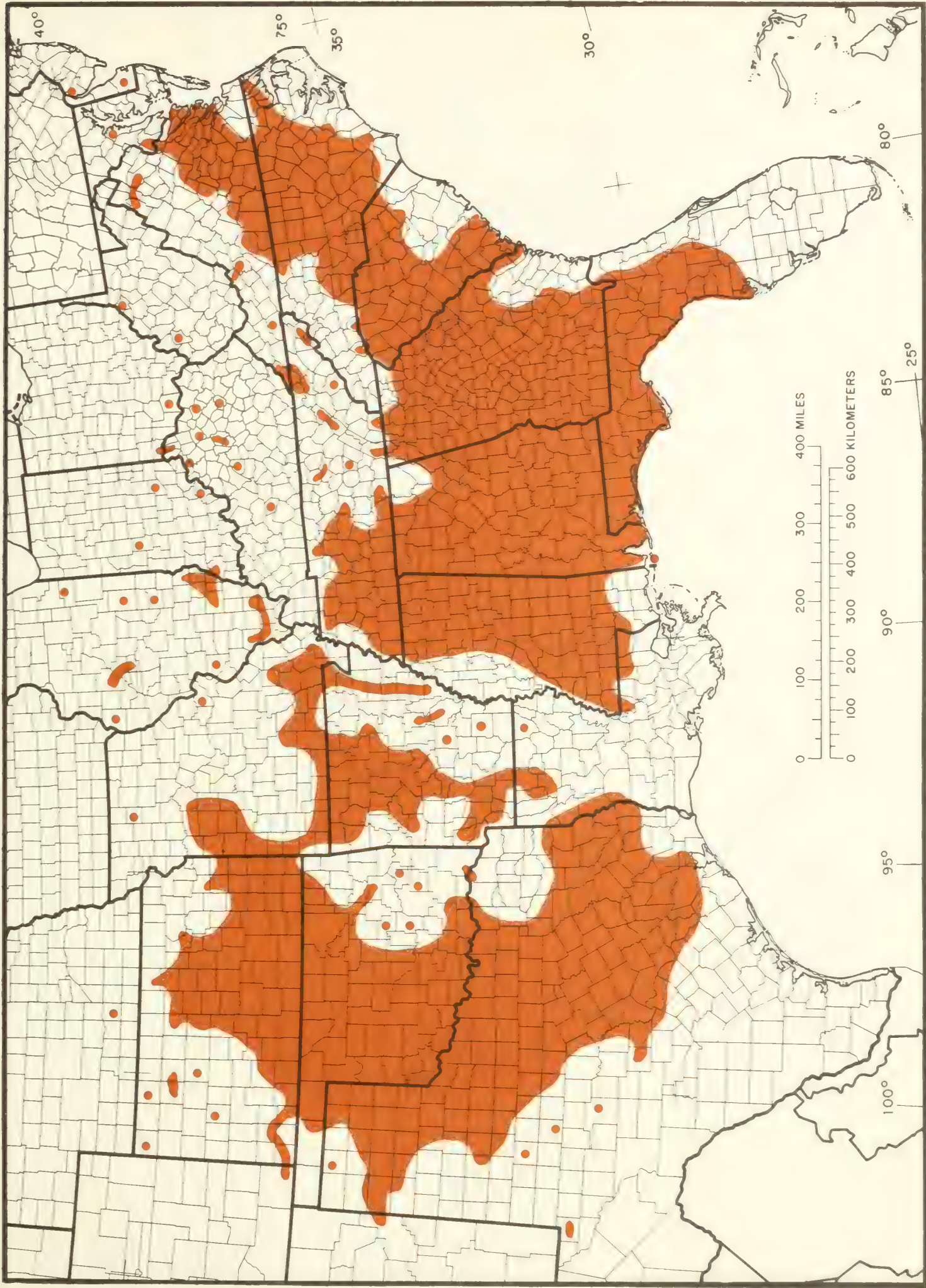
Map 95-NE. *Prunus americana* Marsh., American plum. Western range in Volume 3.



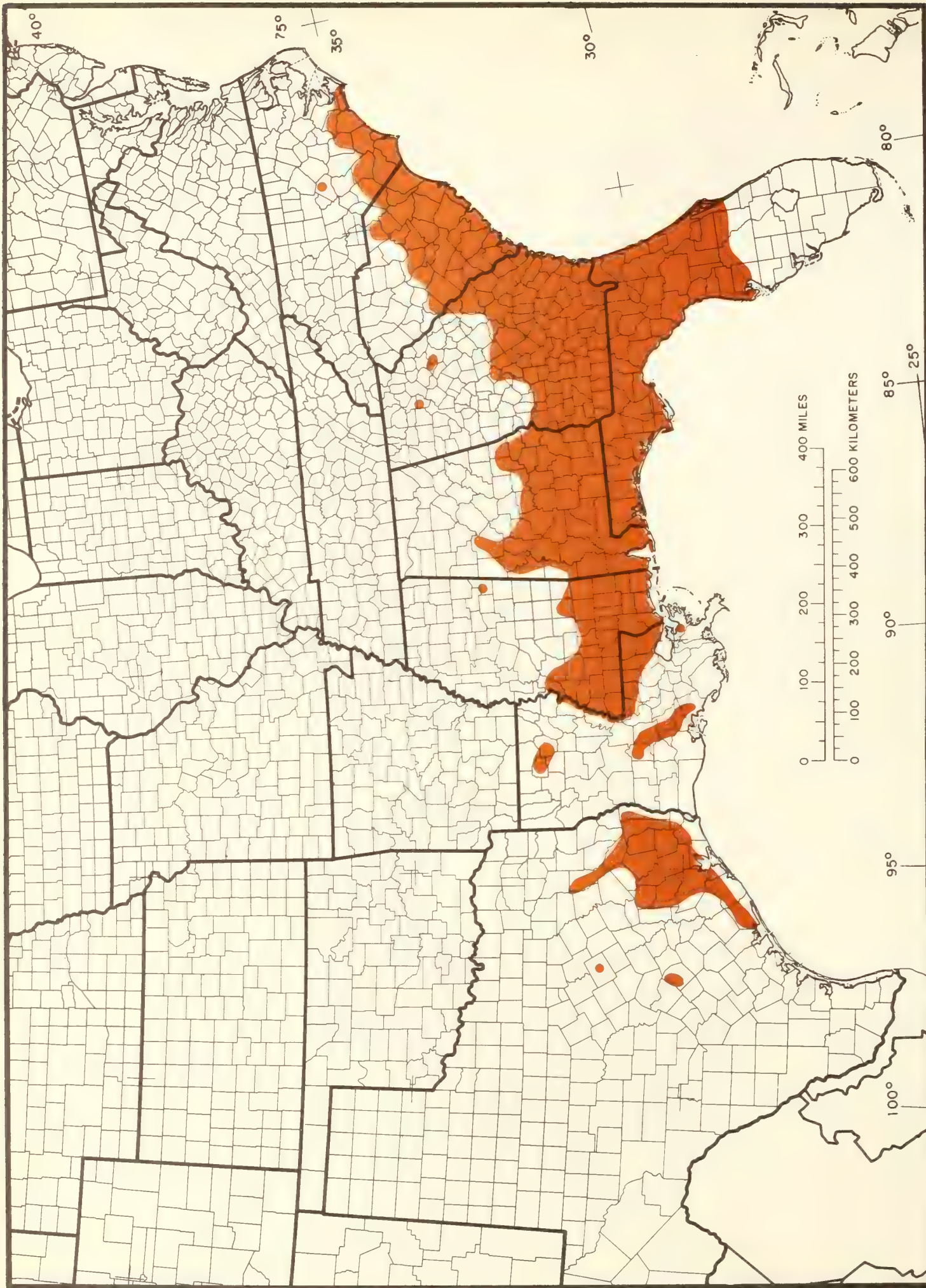
Map 95. SE. *Prunus americana* Marsh., American plum. Western range in Volume 3.



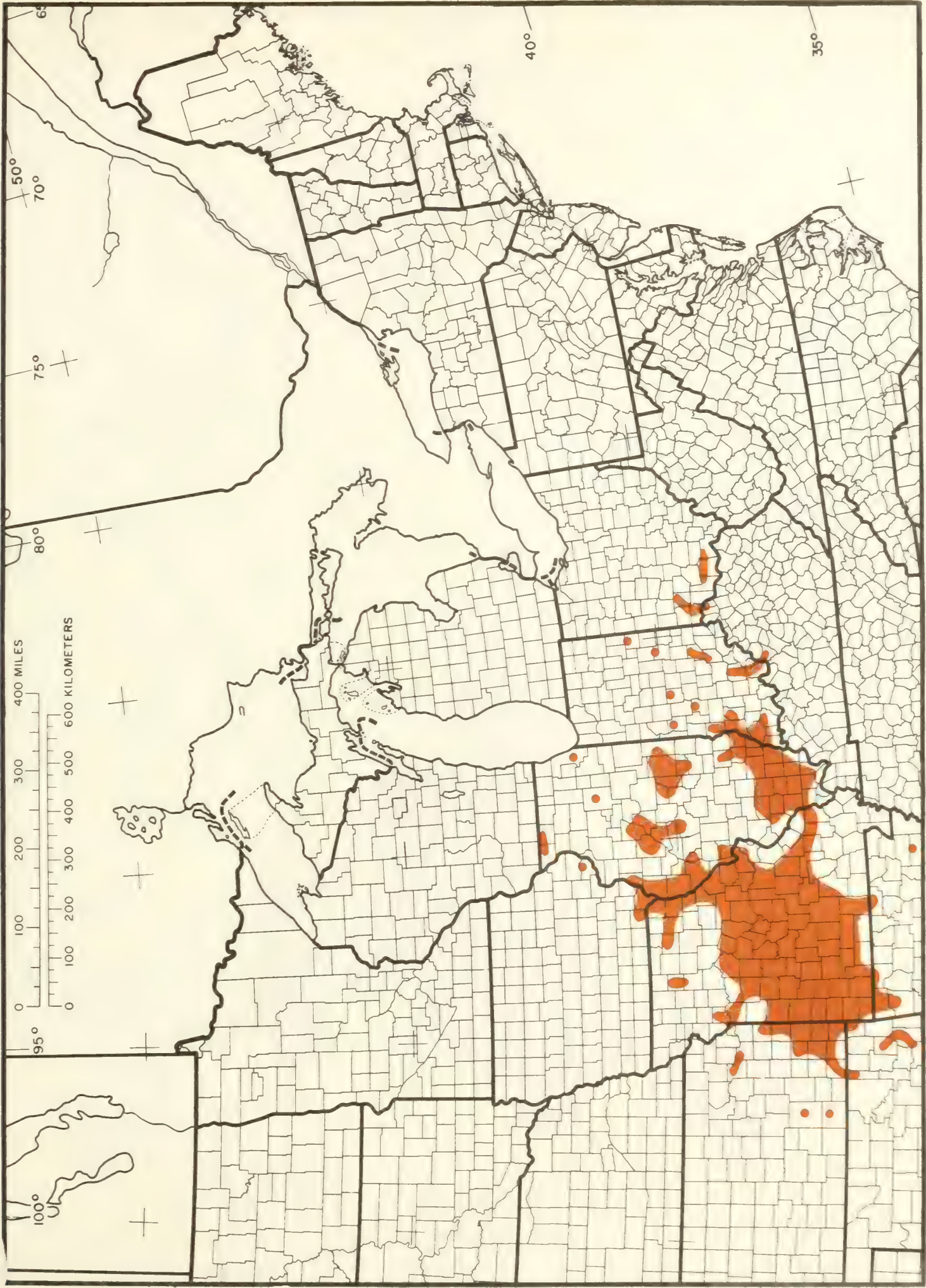
Map 96. *Prunus alleghaniensis* Porter, Allegheny plum.



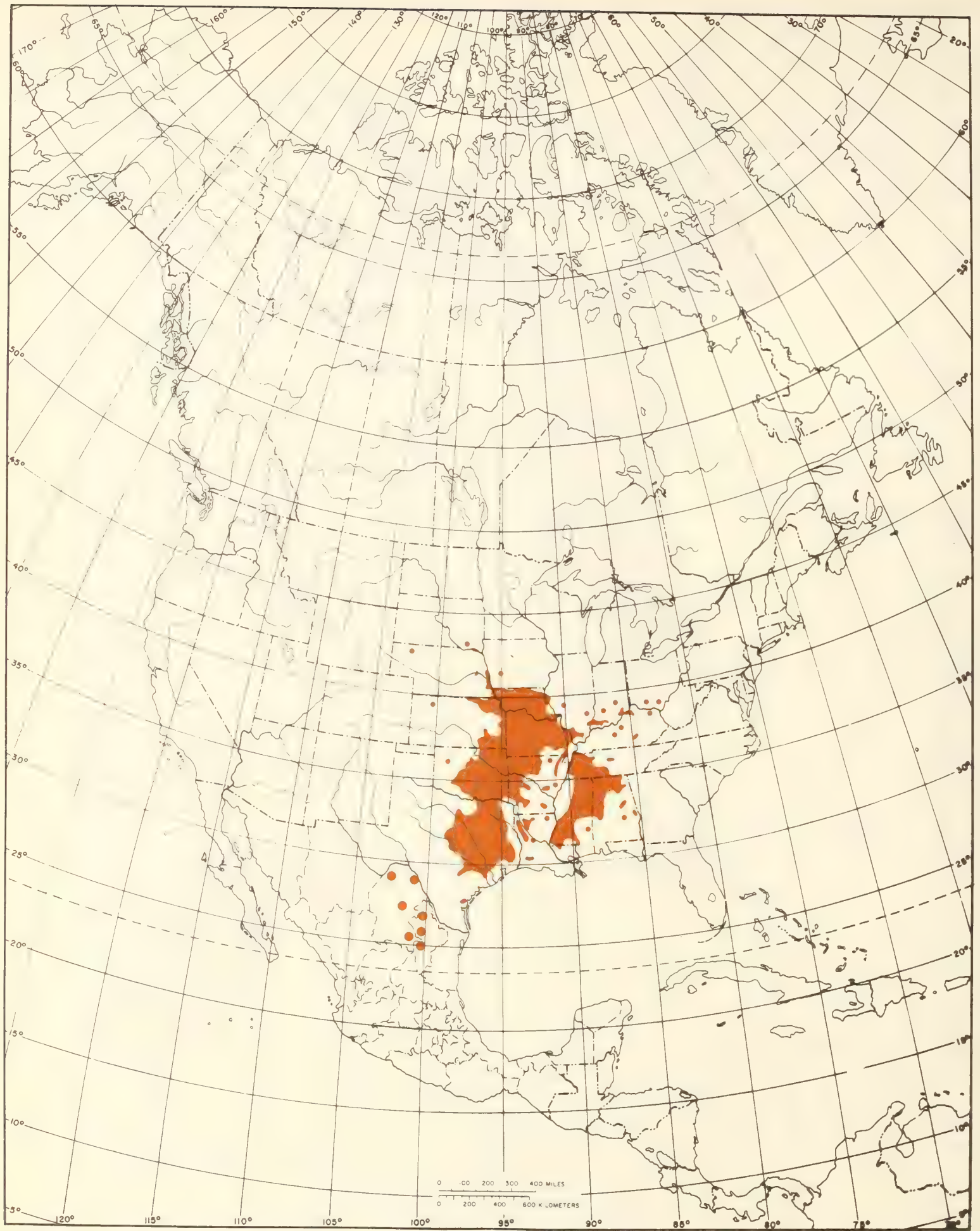
Map 97. *Prunus angustifolia* Marsh., Chickasaw plum. Extensively naturalized and perhaps spread by Indians in prehistoric times. Original native range not accurately known but probably c. Tex. and Okla. Western range in Volume 3.



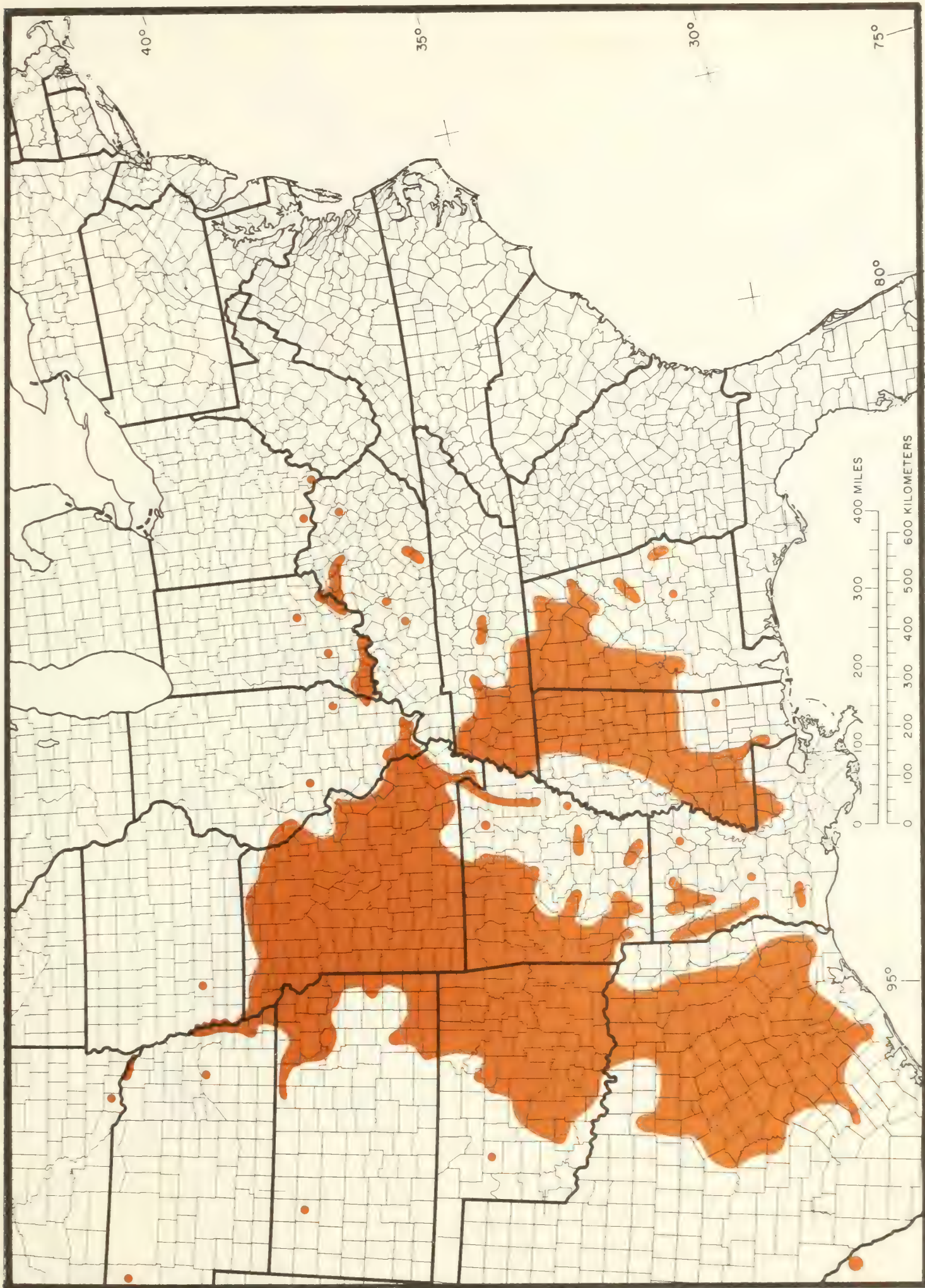
Map 98. *Prunus caroliniana* (Mill.) Ait., Carolina laurelcherry.



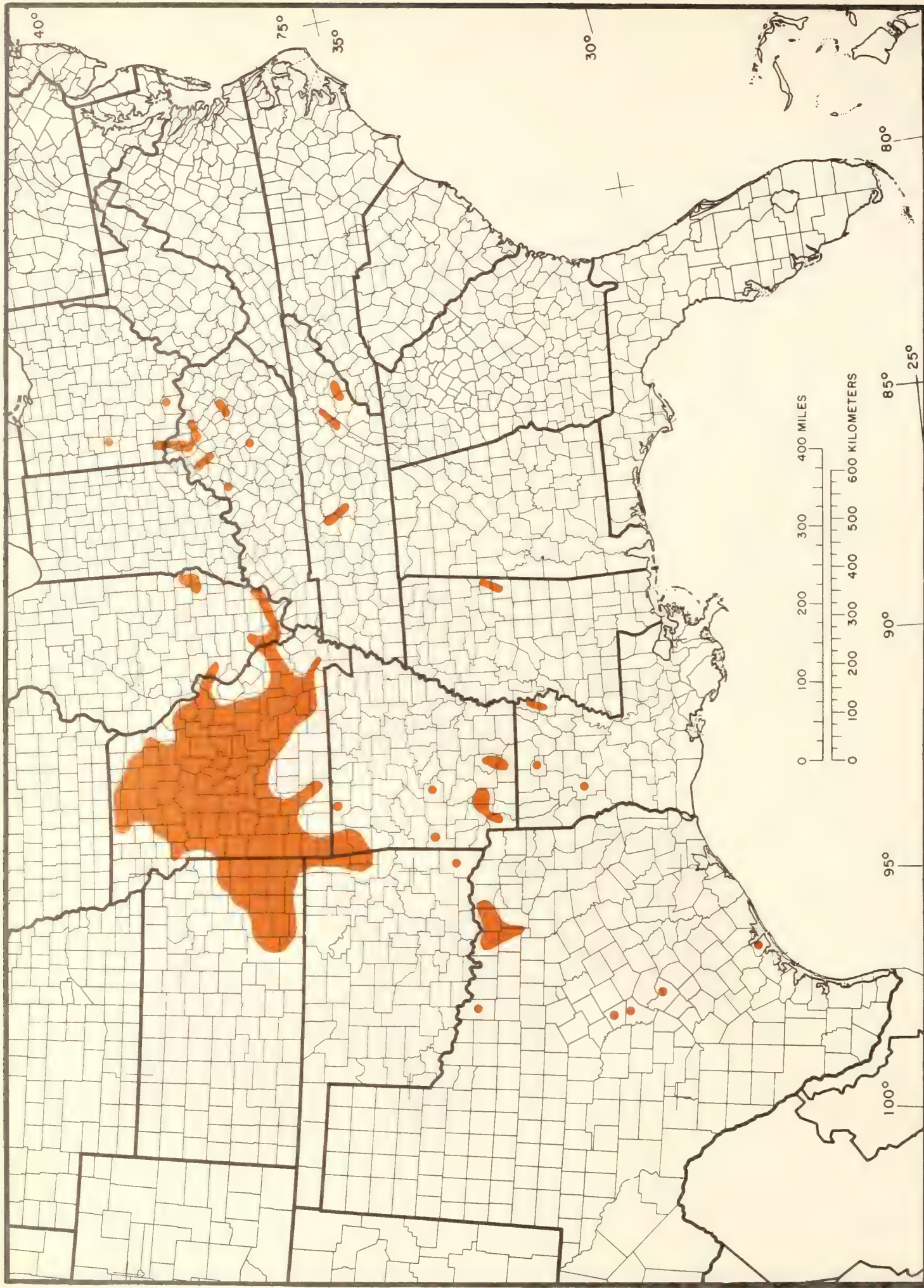
Map 99. *Prunus hortulana* Bailey, hortulan plum.



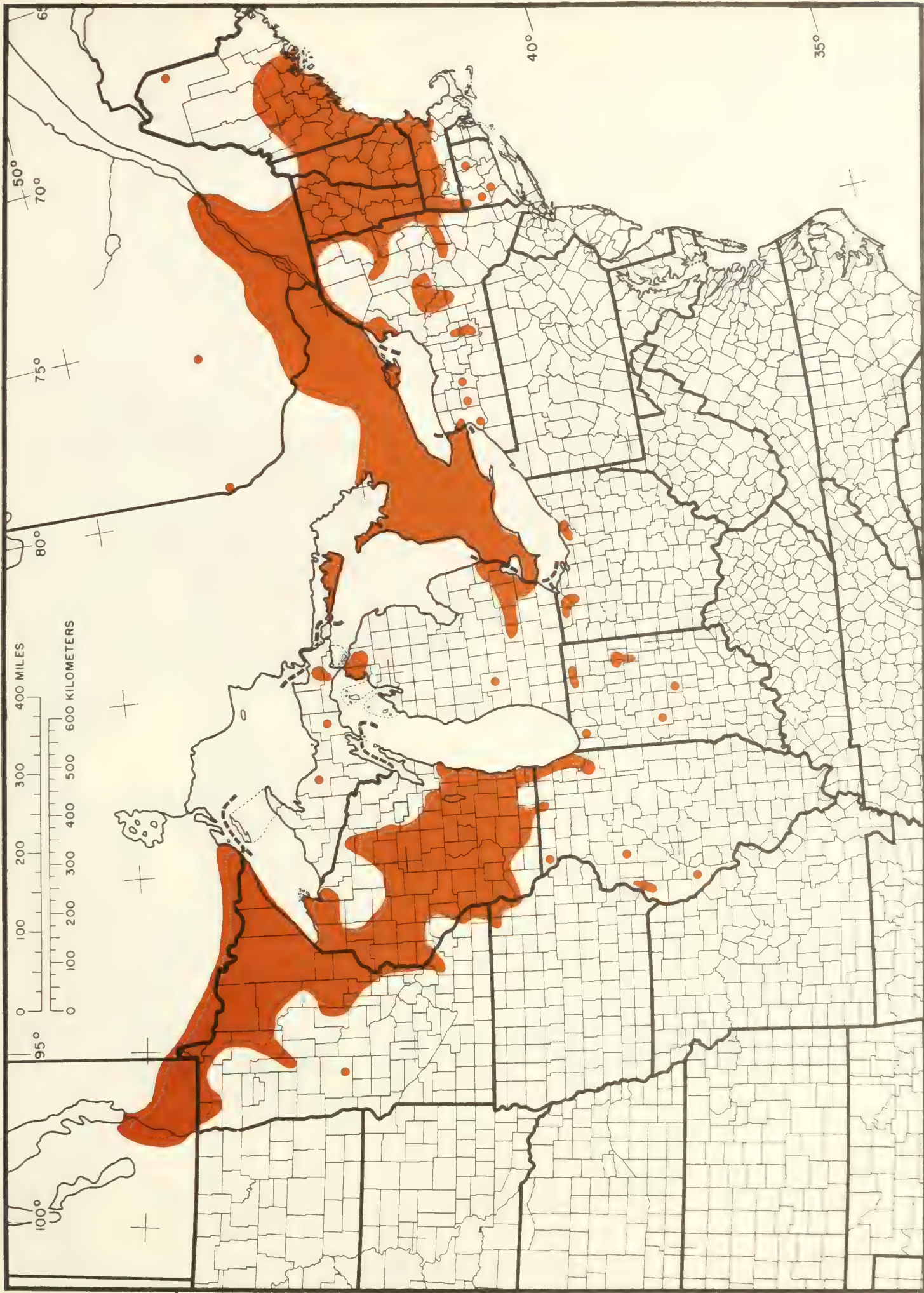
Map 100-N. *Prunus mexicana* Wats., Mexican plum.



Map 100-SE. *Prunus mexicana* Wats., Mexican plum.



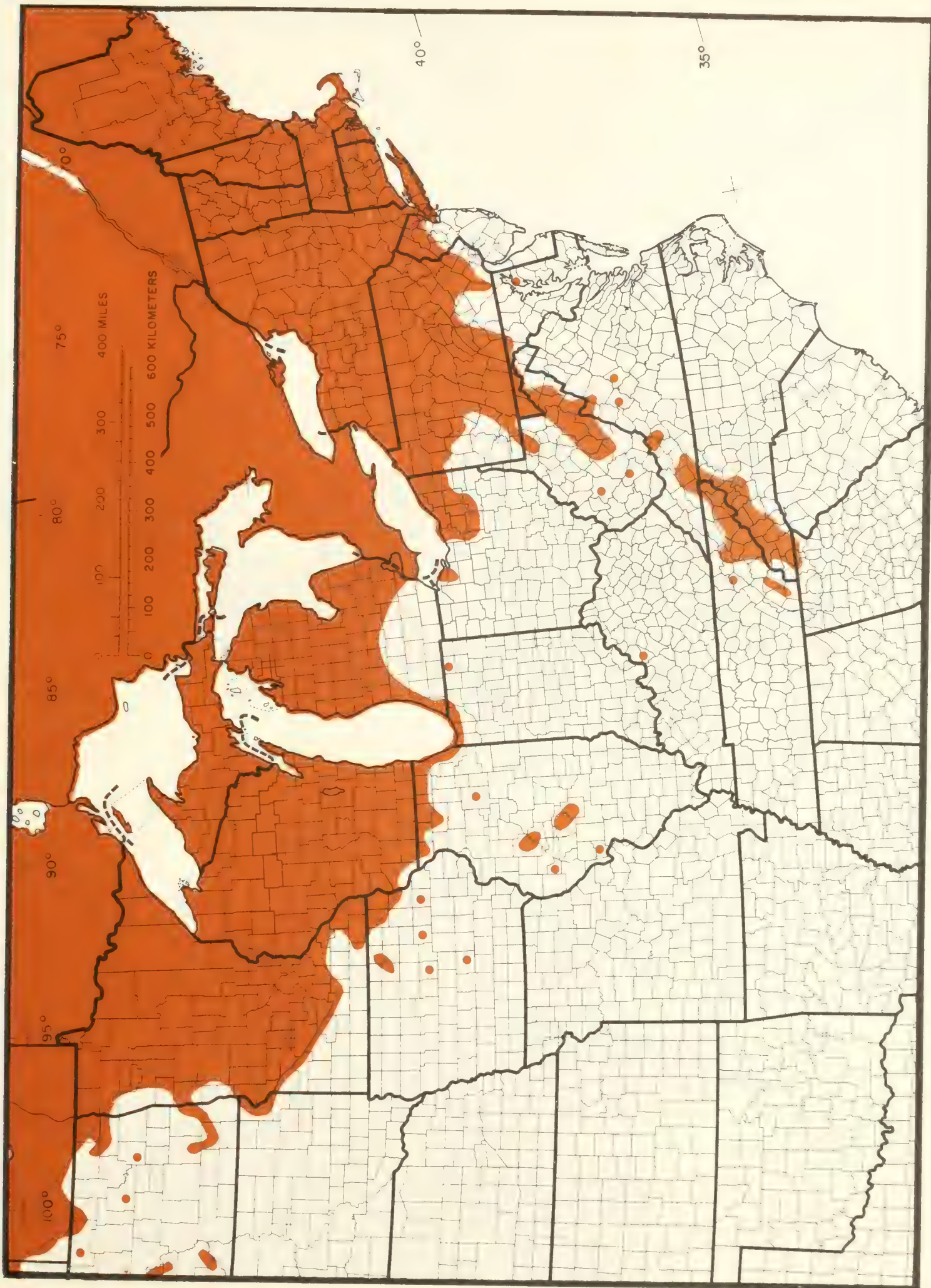
Map 101. *Prunus munsoniana* Wight & Hedr., wildgoose plum.



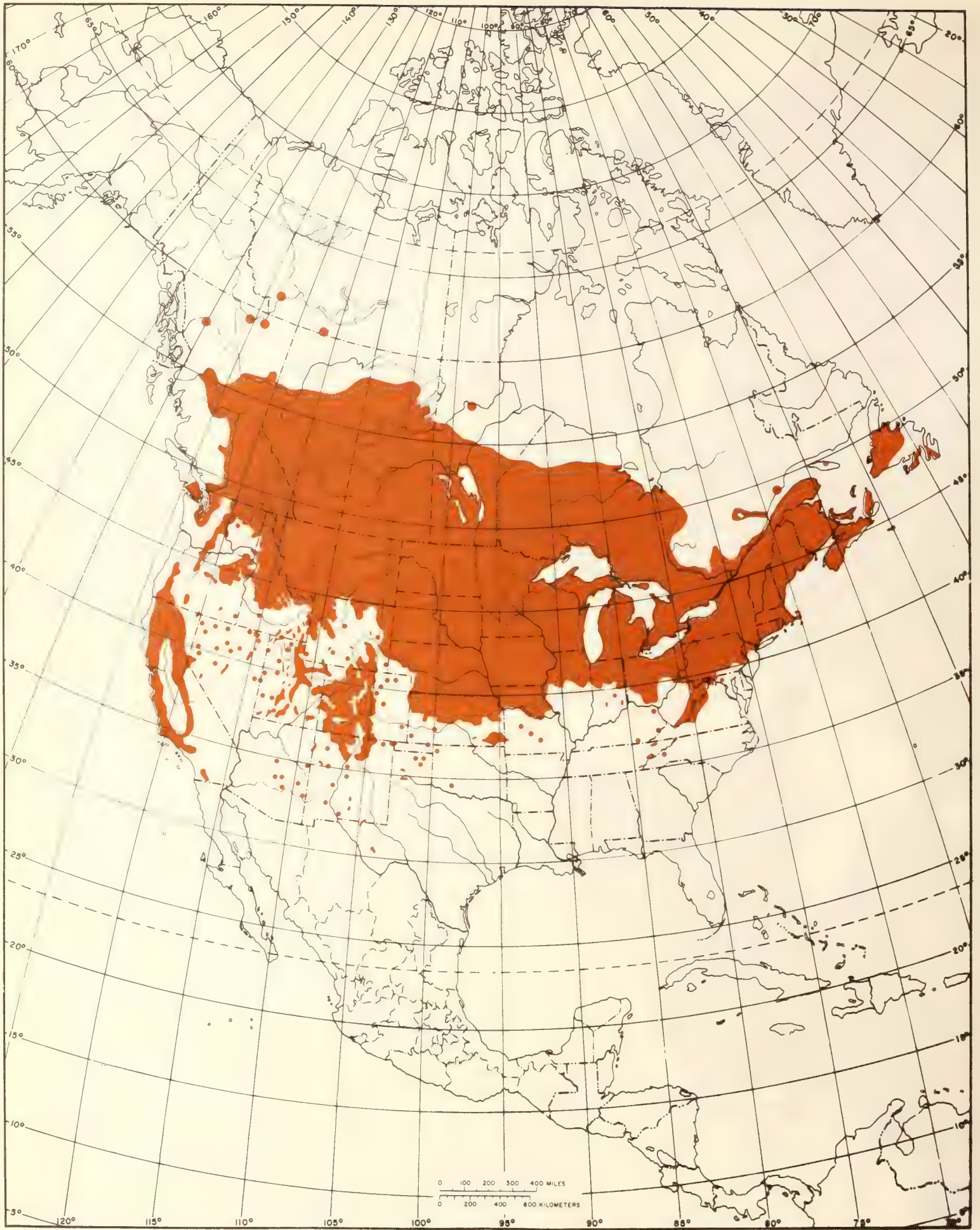
Map 102. *Prunus nigra* Ait., Canada plum. Also s. v. B. and introduced in N.S.



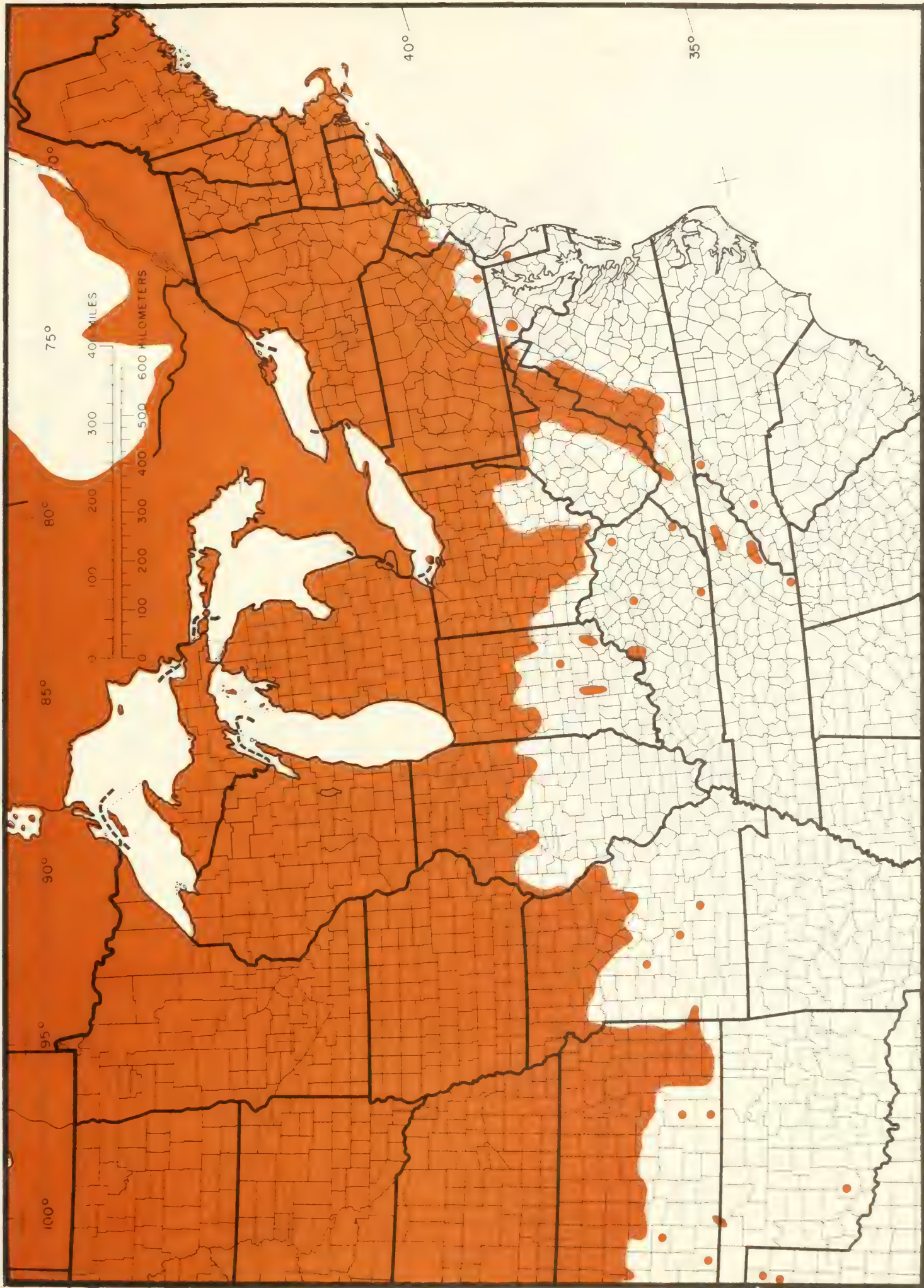
Map 103-N. *Prunus pensylvanica* L. f., pin cherry.



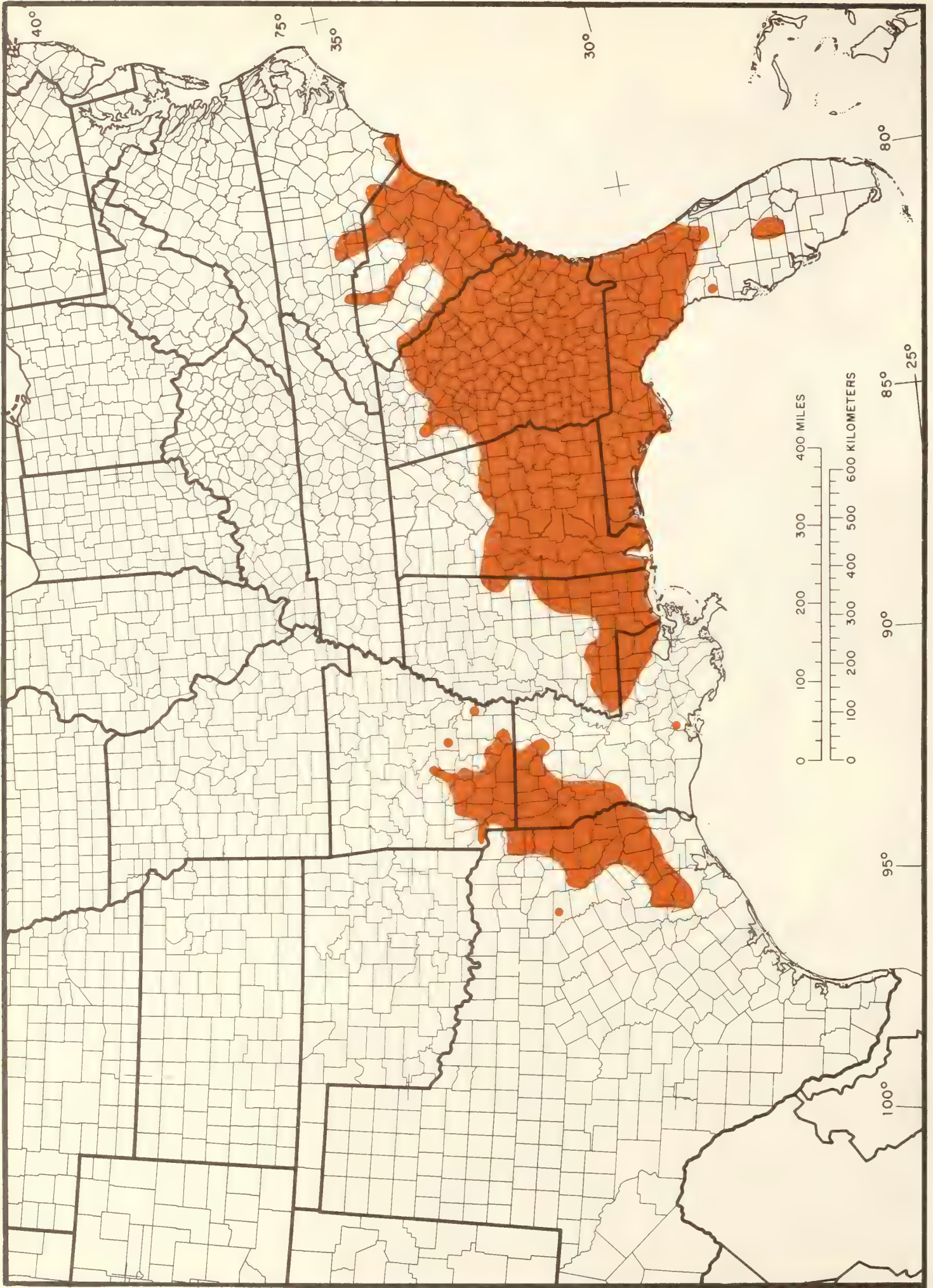
Map 103-NE. *Prunus pensylvanica* L. f., pin cherry. Western range in Volume 4.



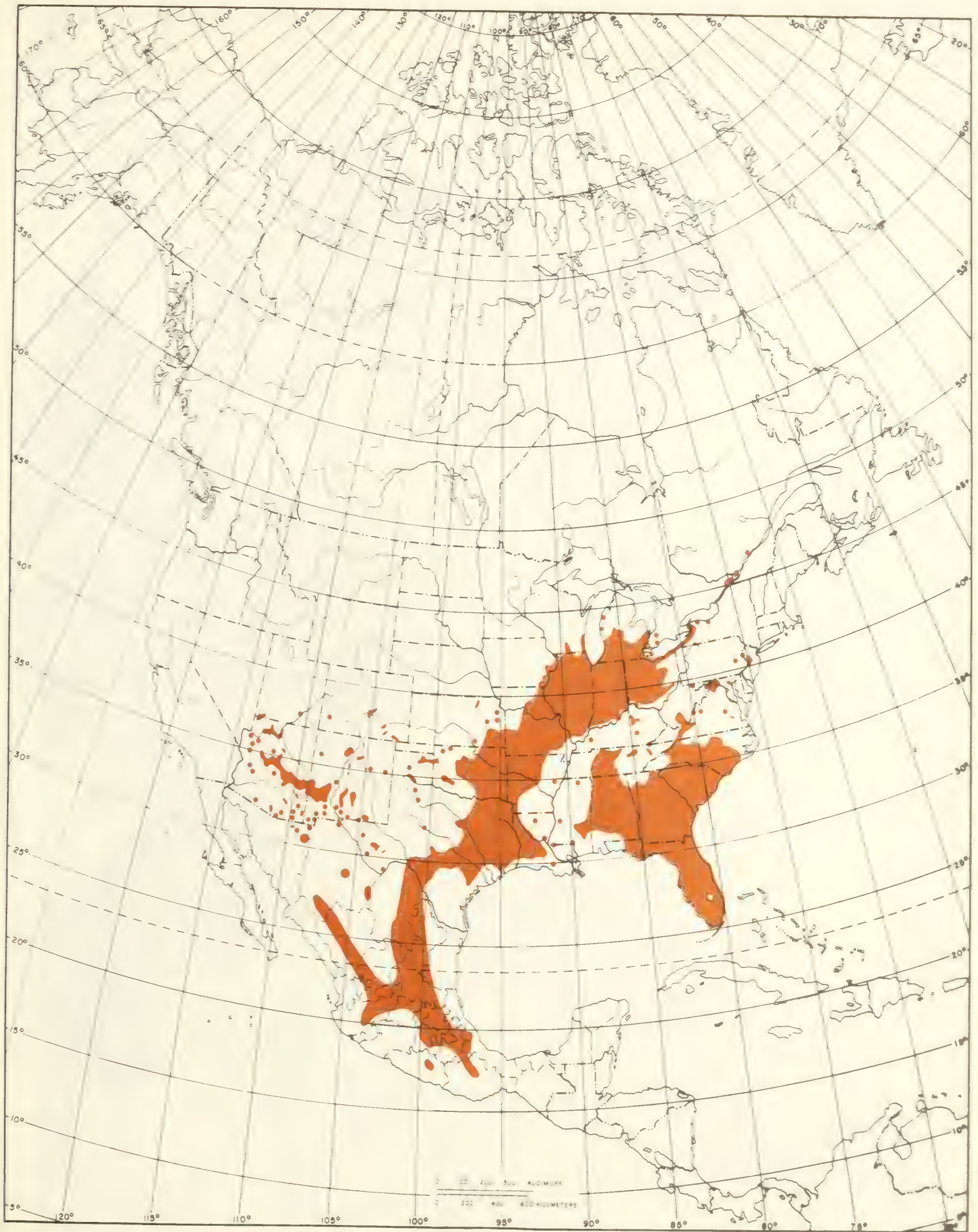
Map 104-N. *Prunus virginiana* L., common chokecherry.



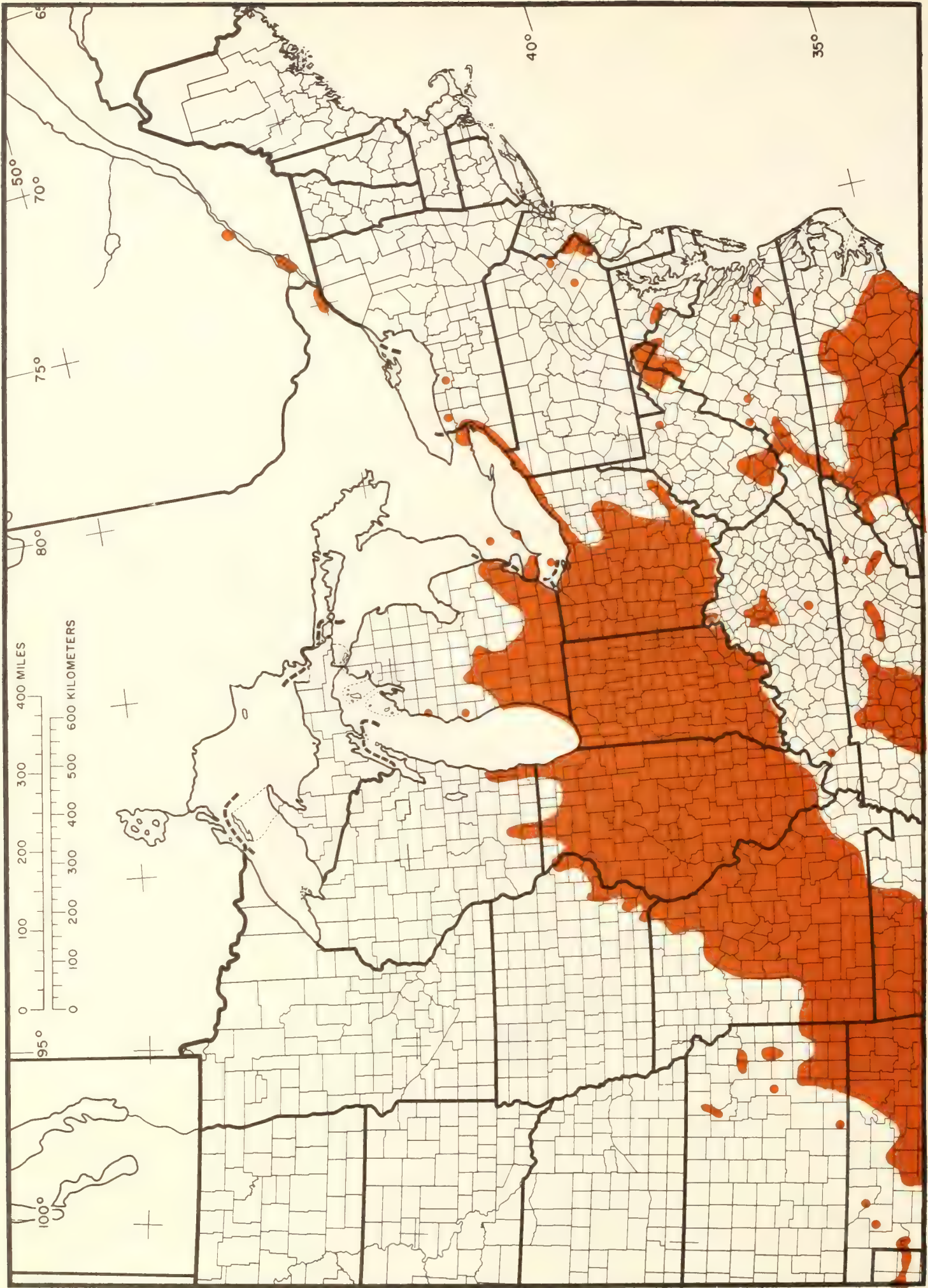
Map 101-NE. *Prunus virginiana* L., common chokecherry. Western range in Volume I.



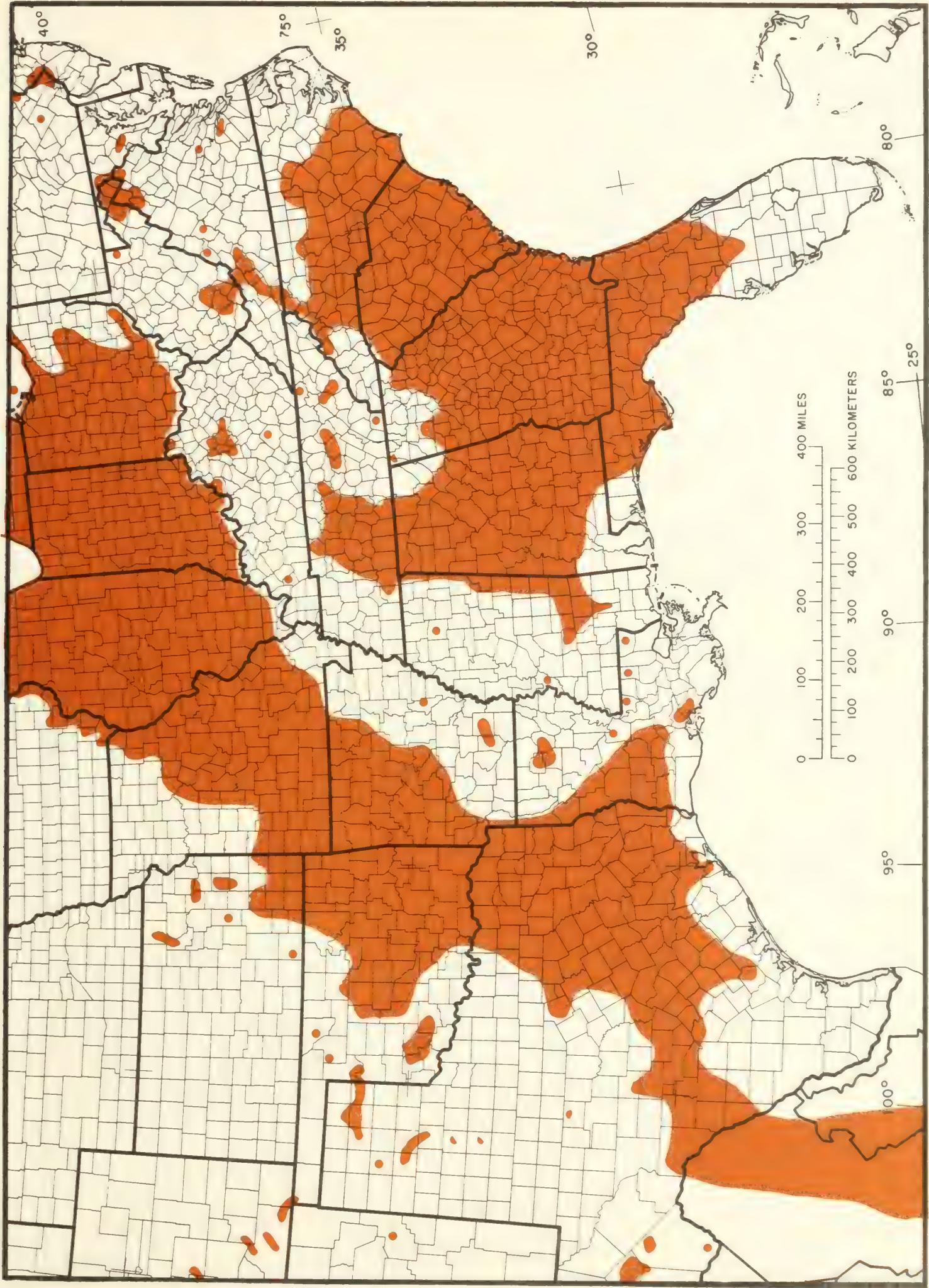
Map 105. *Prunus umbellata* Ell., flatwoods plum.



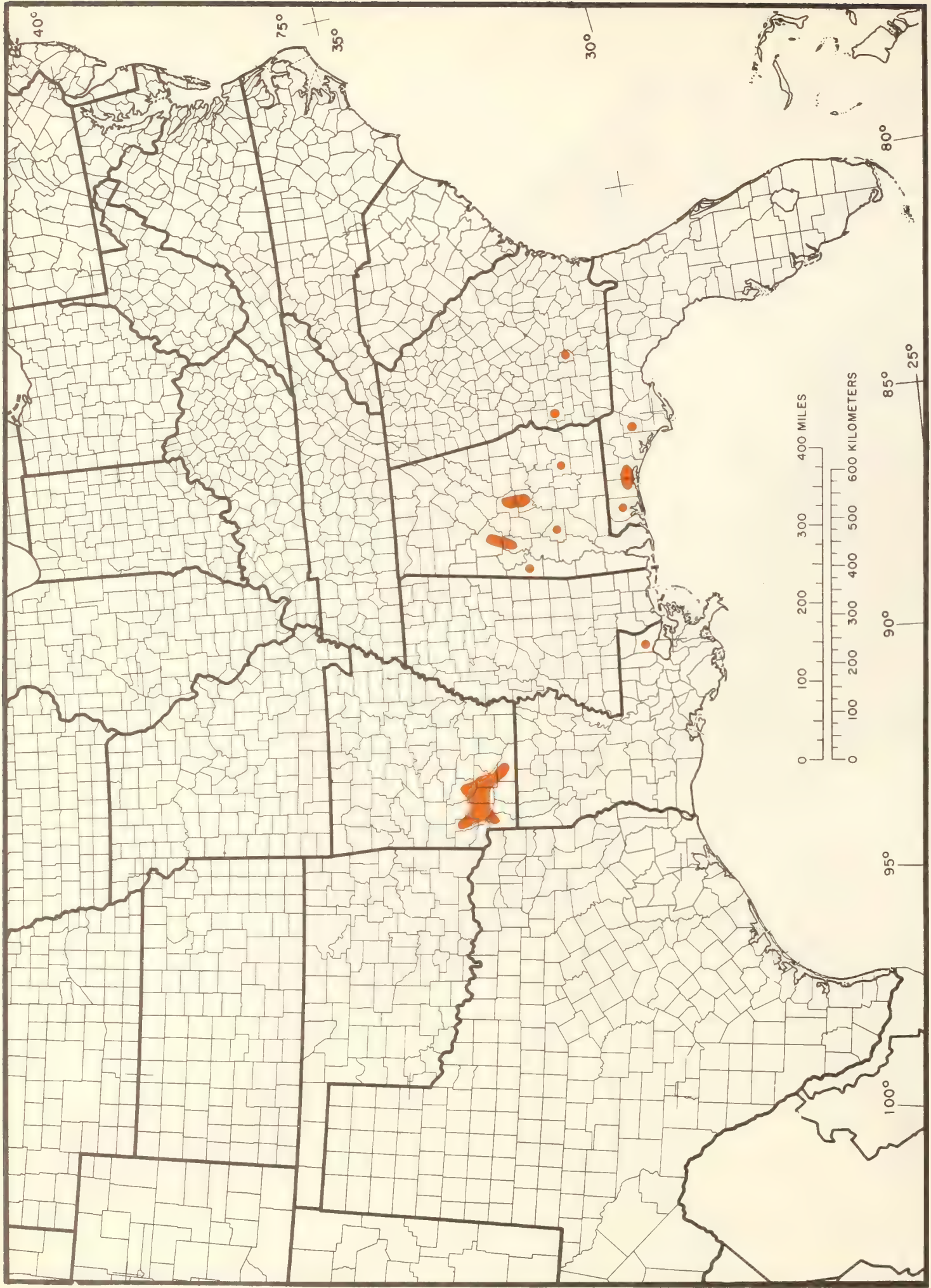
Map 106-N. *Ptelea trifoliata* L., common hoptree.



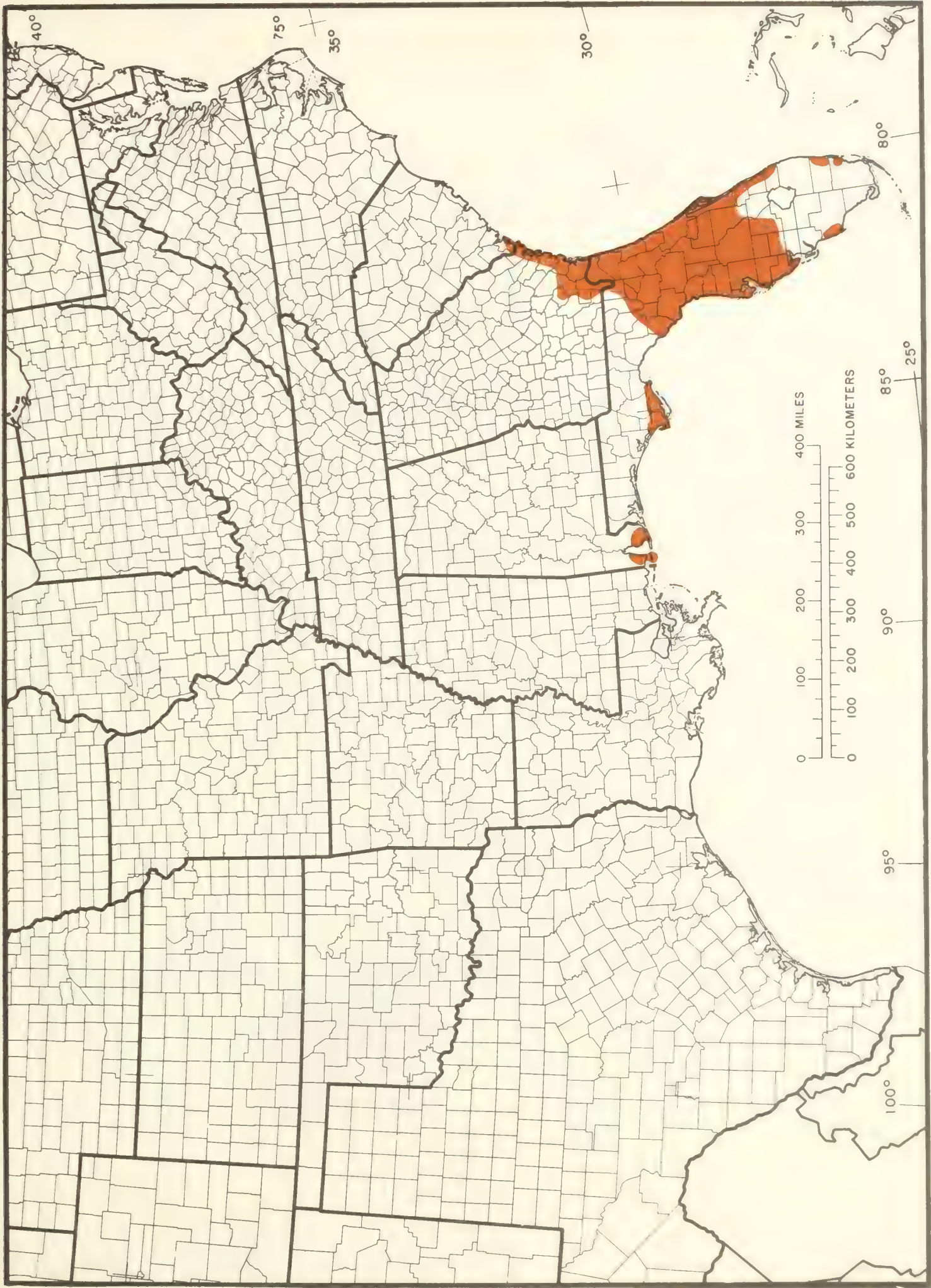
Map 106-NE. *Ptelea trifoliata* L., common hop tree. Western range in Volume 3.



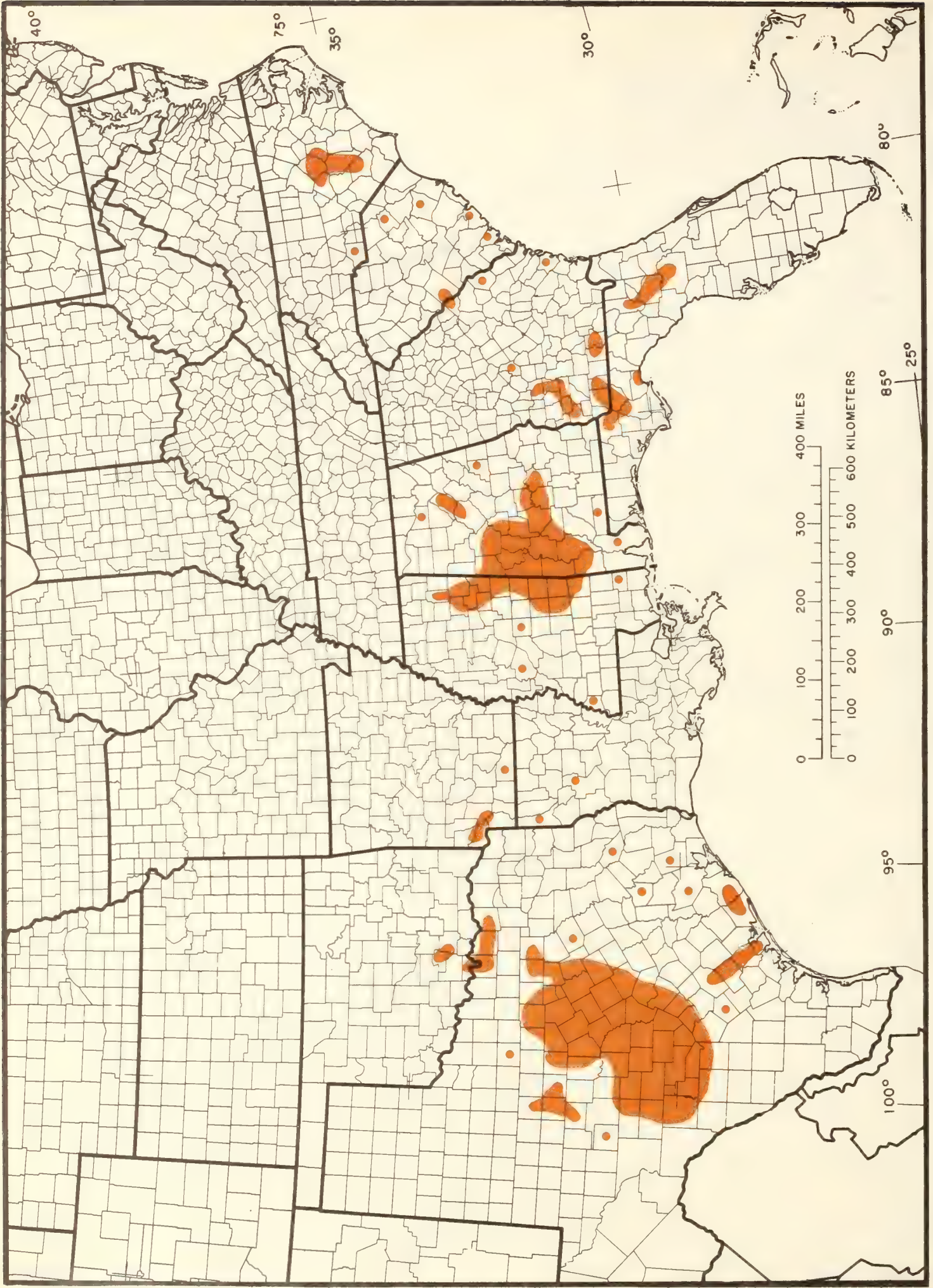
Map 106-SE. *Pelea trifoliata* L., common hoptree. Western range in Volume 3.



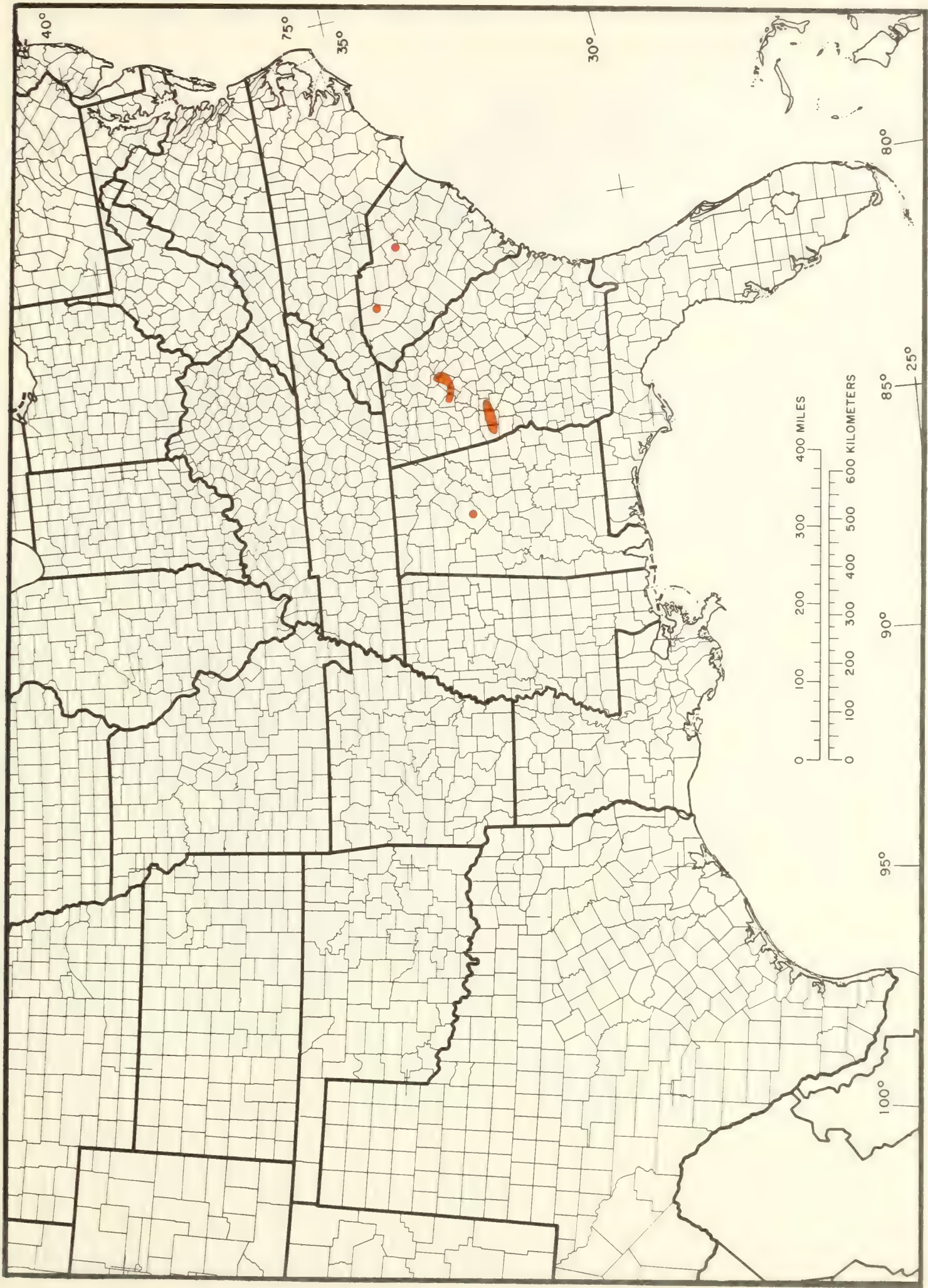
Map 107. *Quercus arkansana* Sarg., Arkansas oak.



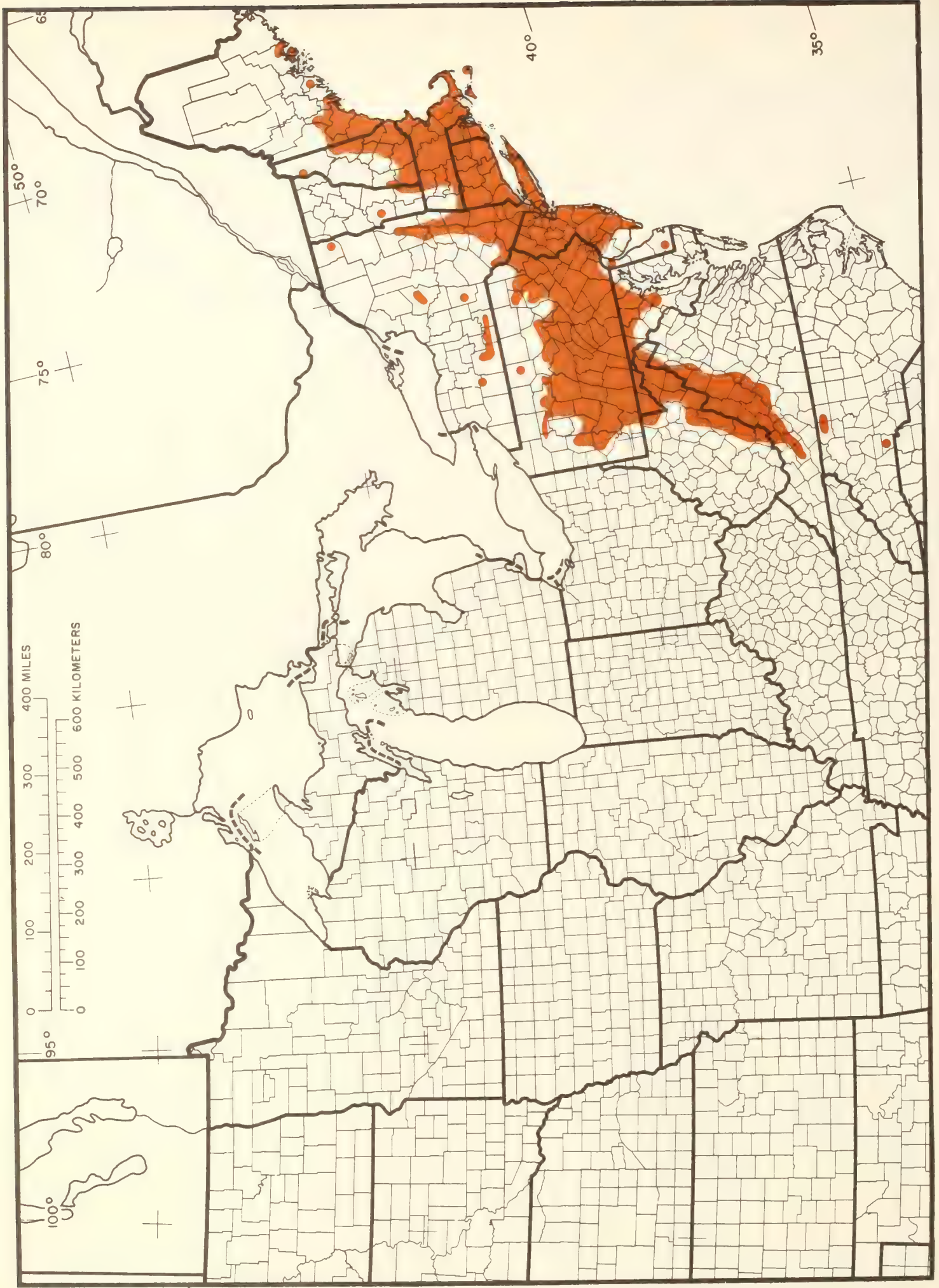
Map 108. *Quercus chapmanii* Sarg., Chapman oak.



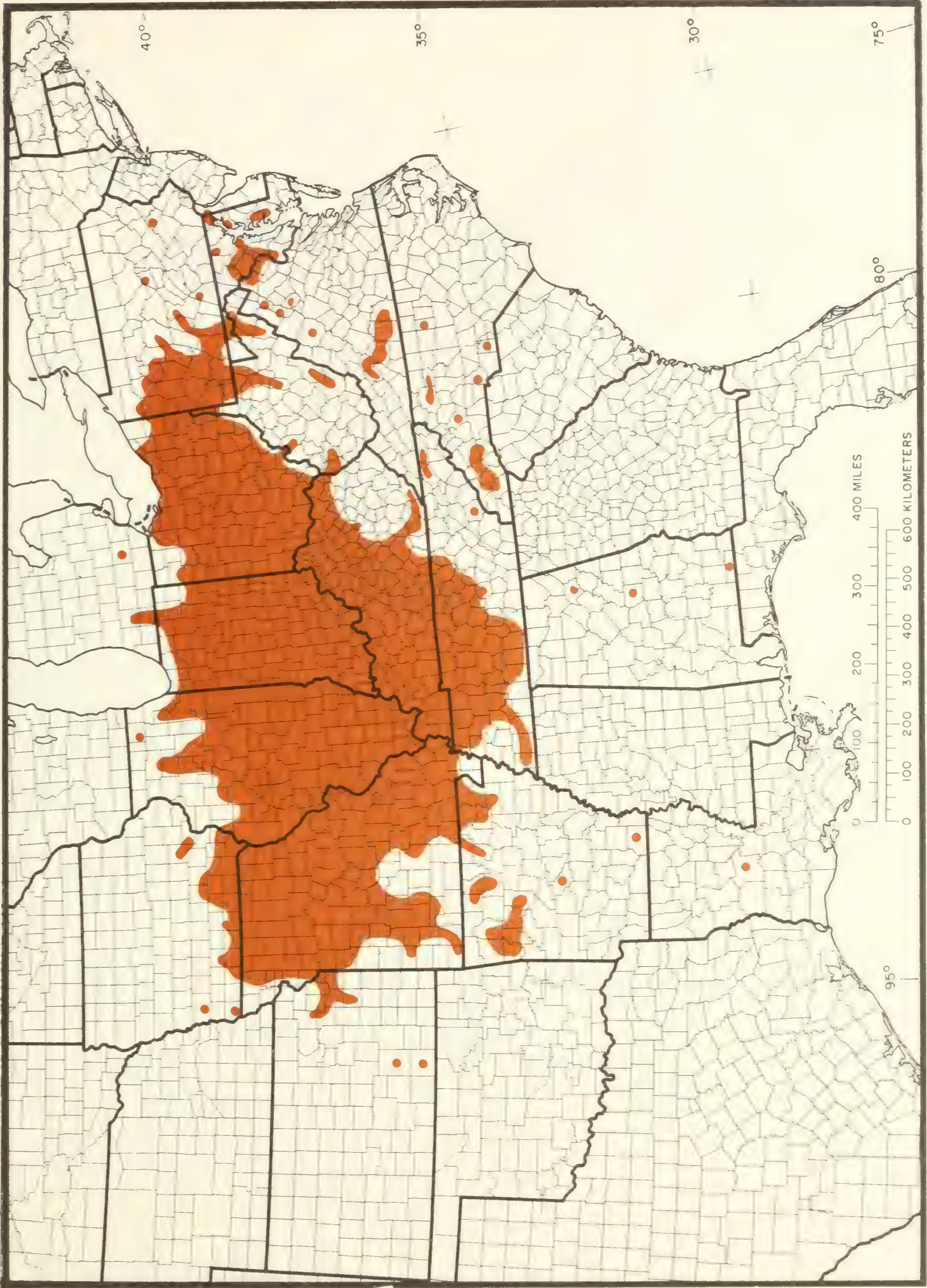
Map 109. *Quercus durandii* Buckl., Durand oak.



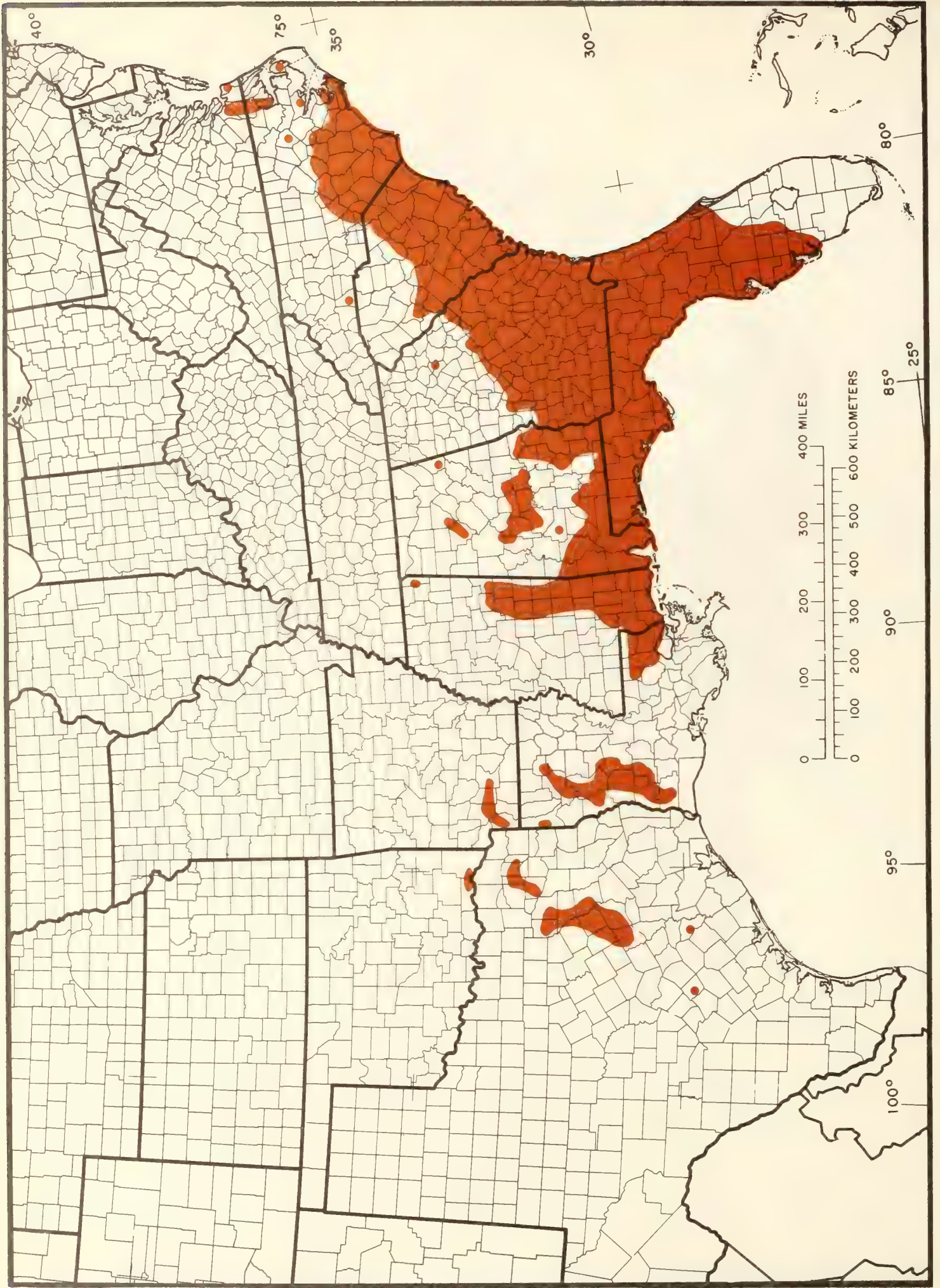
Map 110. *Quercus georgiana* M. A. Curtis, Georgia oak. Rare and local in S. C., n. Ga., and n. Ala.



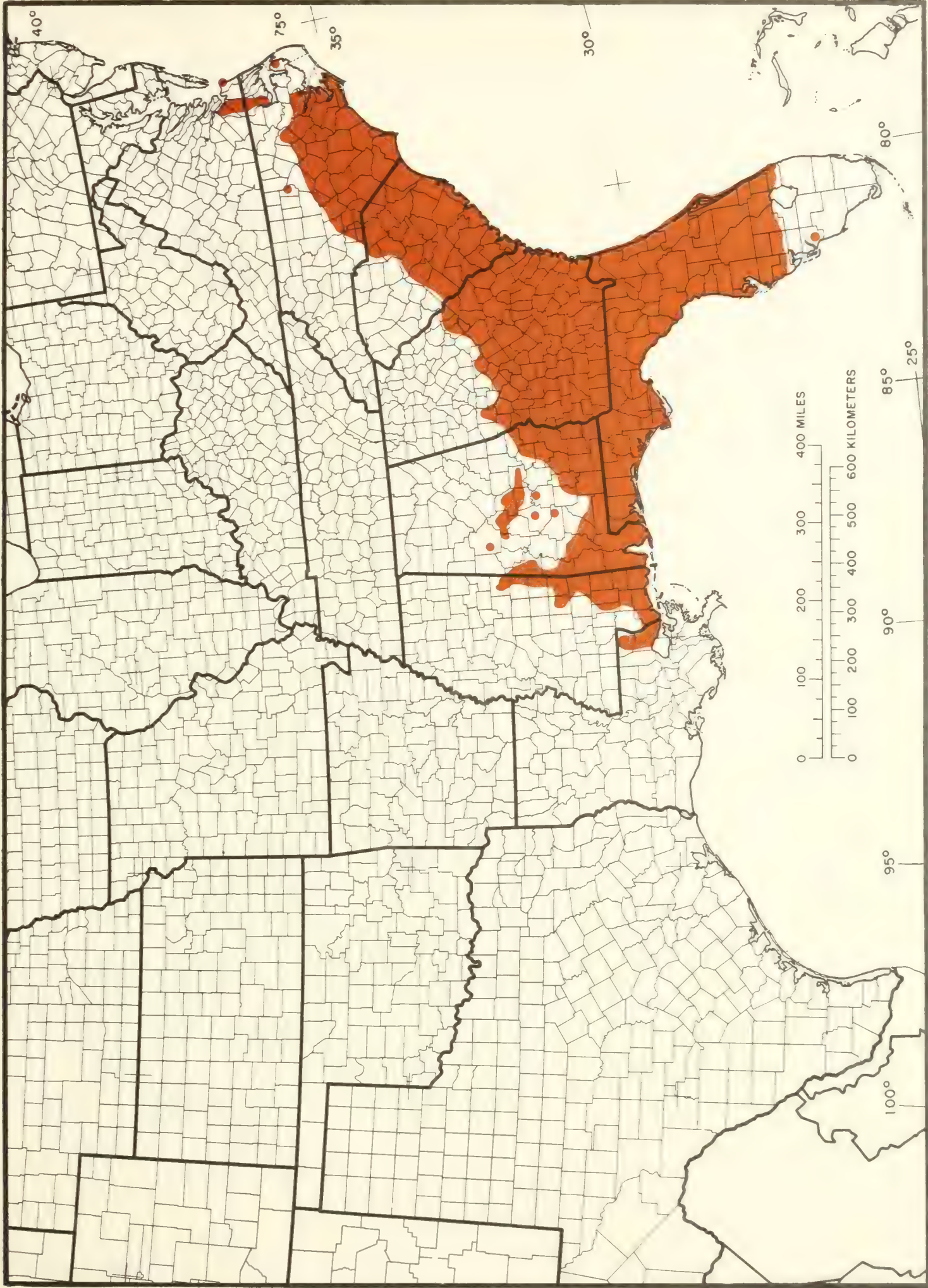
Map 111. *Quercus tlicifolia* Wangenh., bear oak.



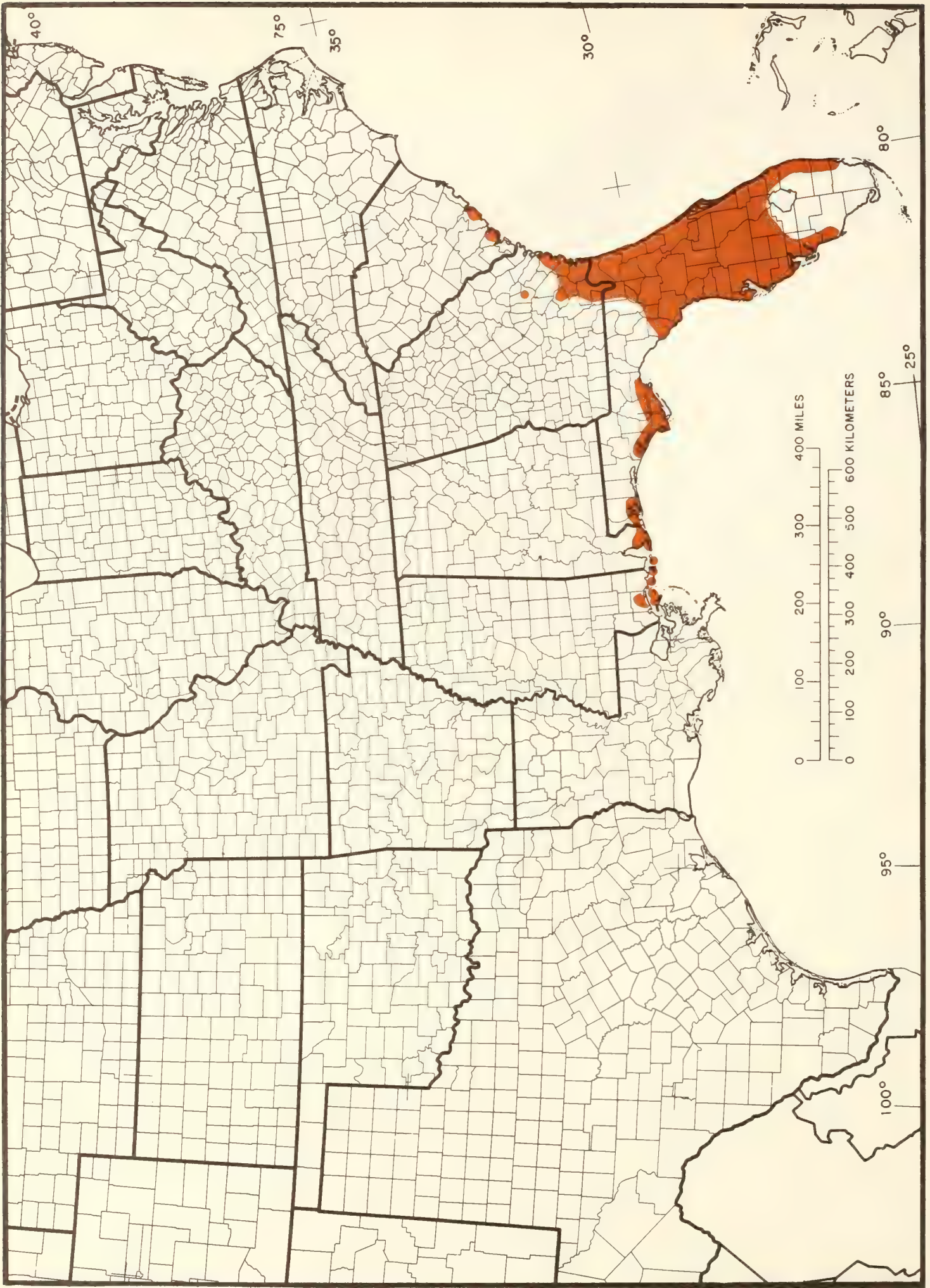
Map 112. *Quercus imbricaria* Michx., shingle oak.



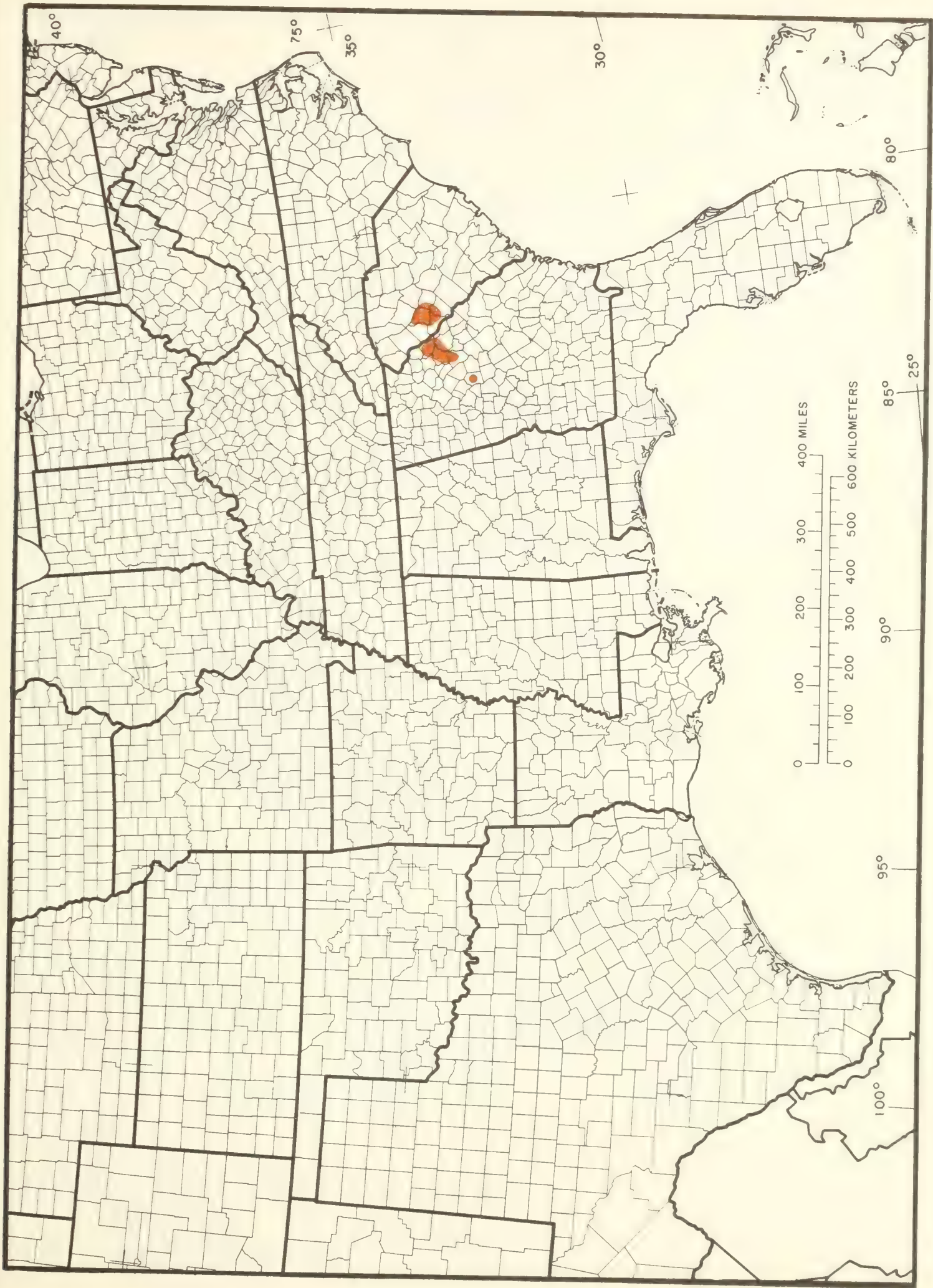
Map 113. *Quercus incana* Bartr., bluejack oak.



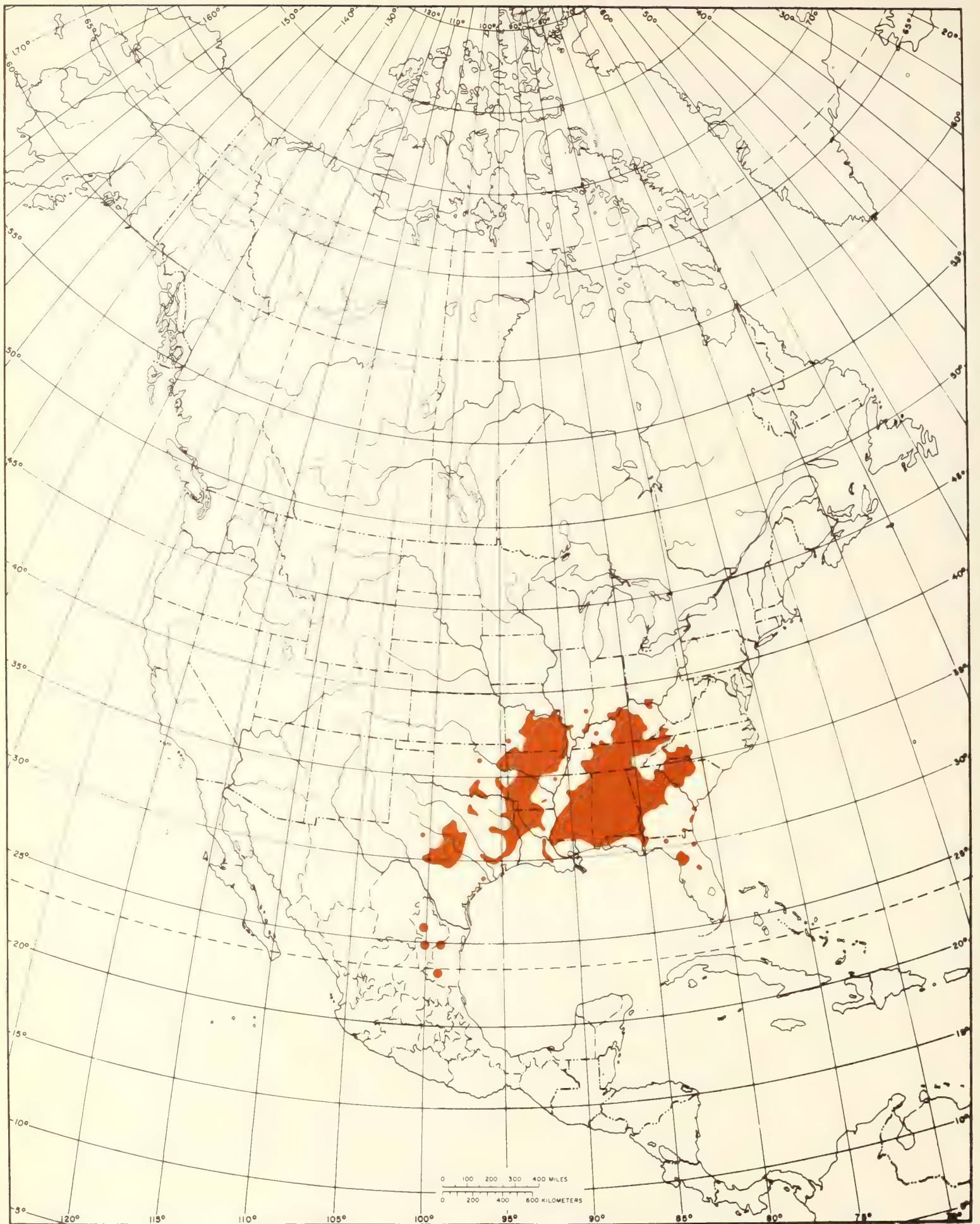
Map 114. *Quercus laevis* Walt., turkey oak.



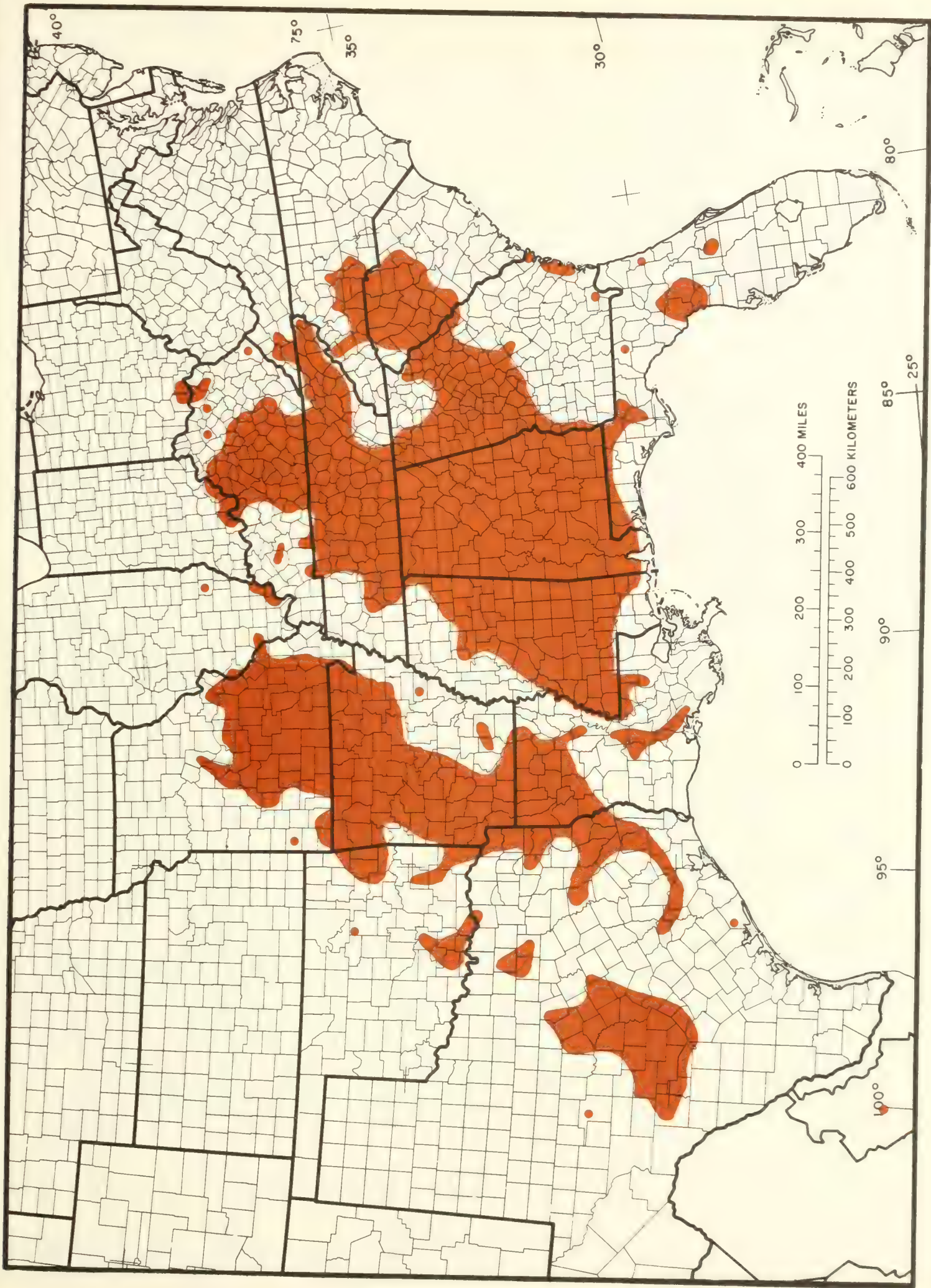
Map 115. *Quercus myrtifolia* Willd., myrtle oak.



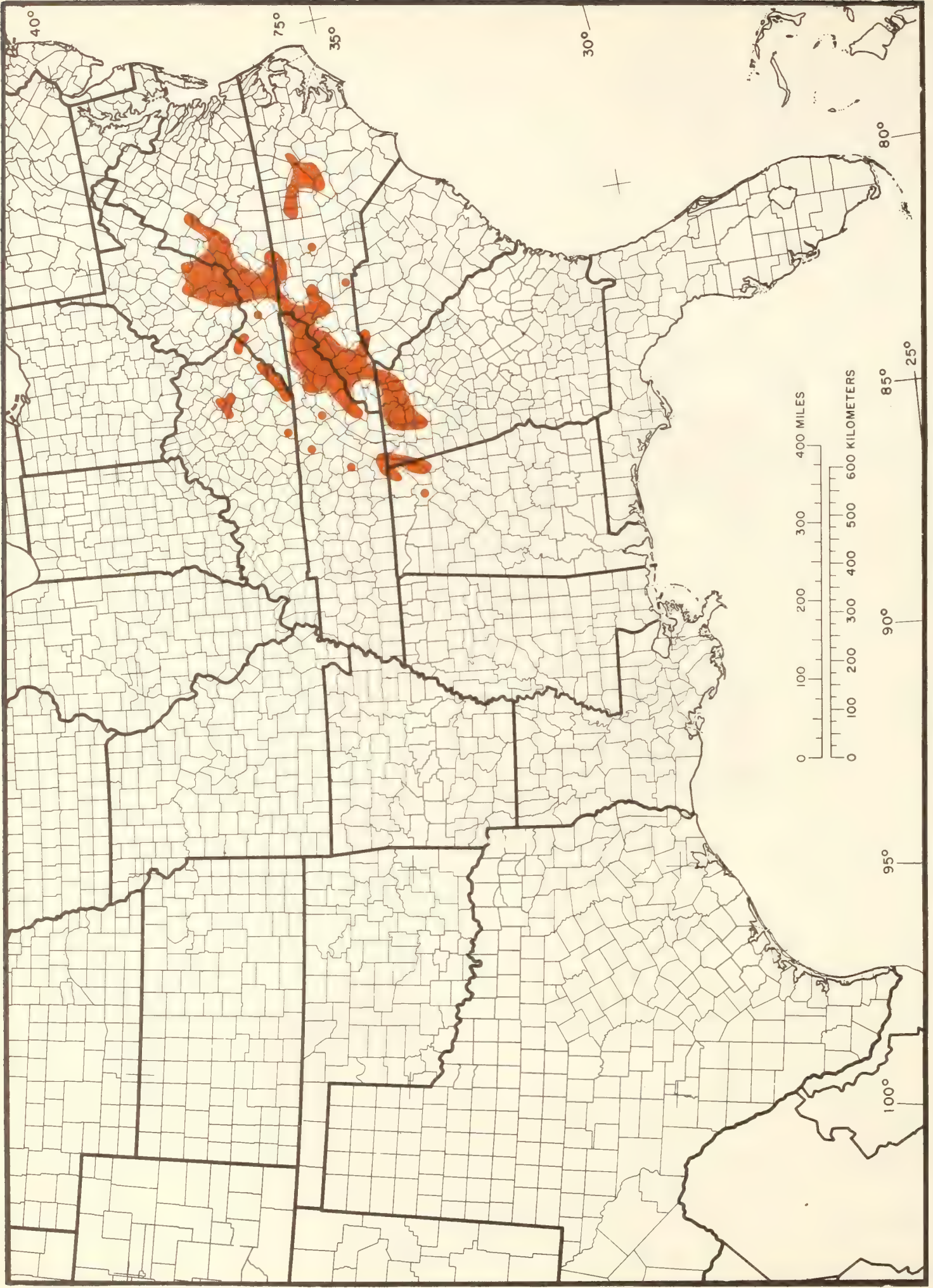
Map 116. *Quercus oglethorpensis* Duncan. Local in w. S. C. and ne. Ga.



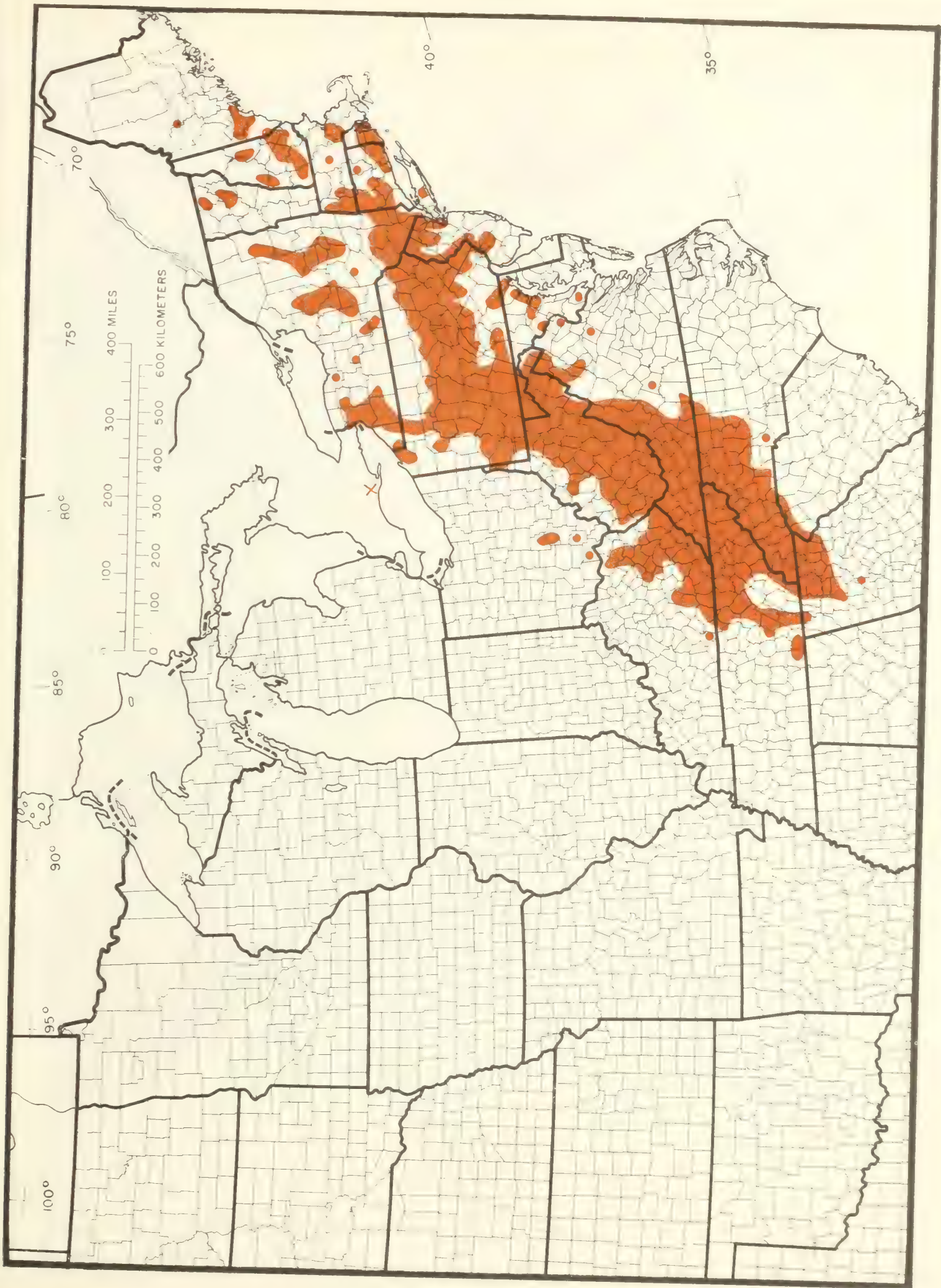
Map 117-N. *Rhamnus caroliniana* Walt., Carolina buckthorn.



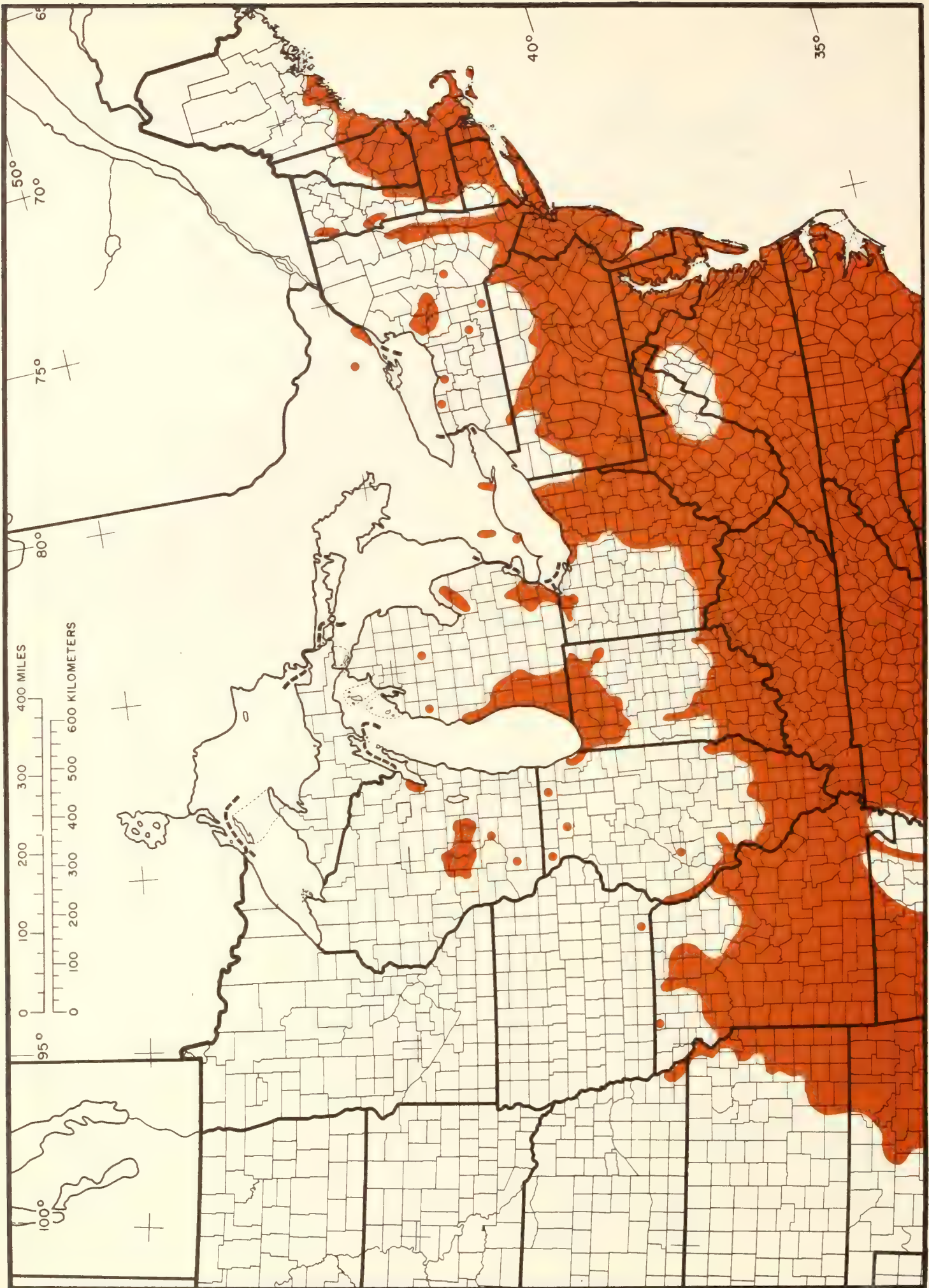
Map 117-SE. *Rhamnus caroliniana* Walt., Carolina buckthorn.



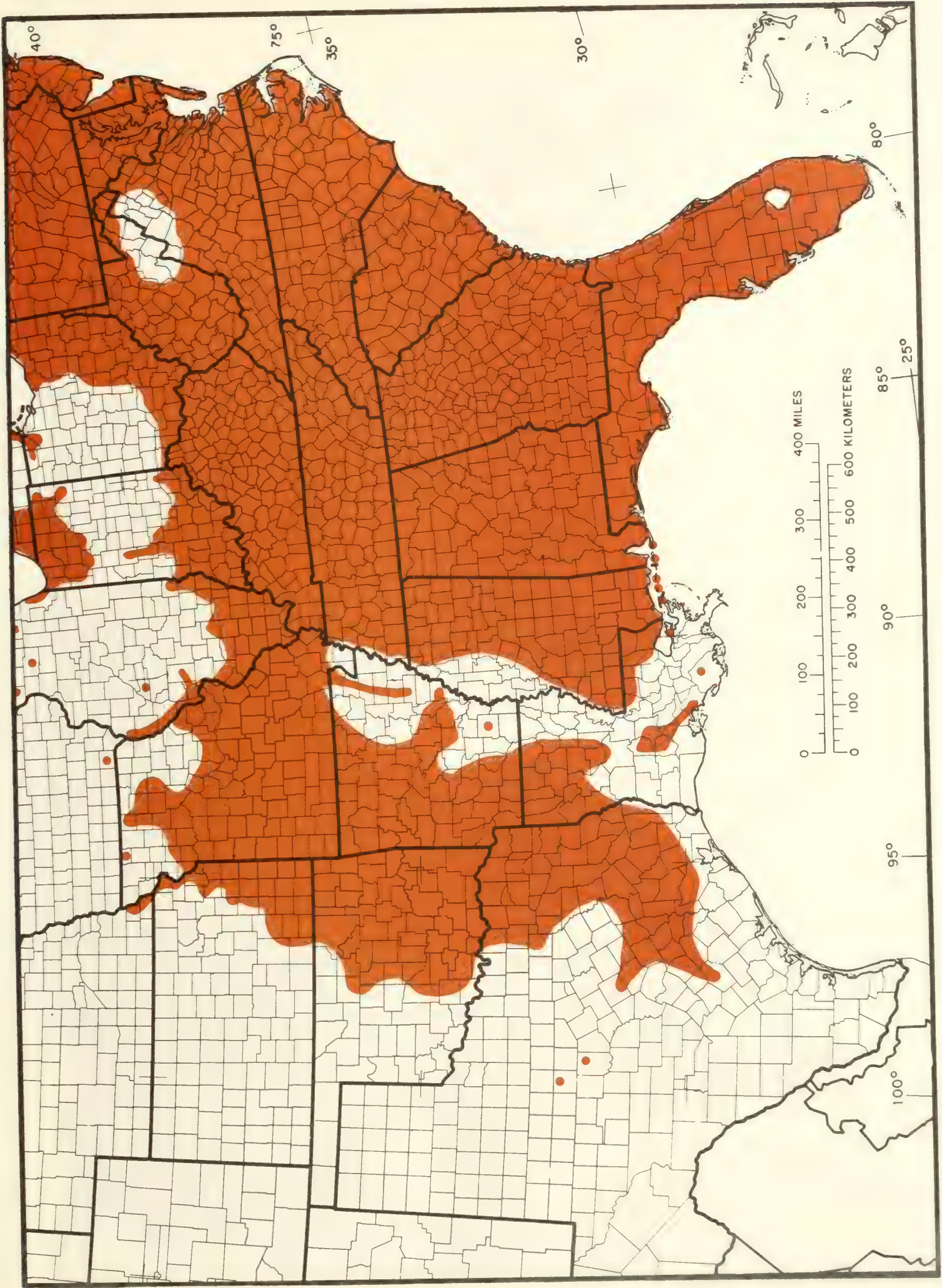
Map 118. *Rhododendron catawbiense* Michx., Catawba rhododendron.



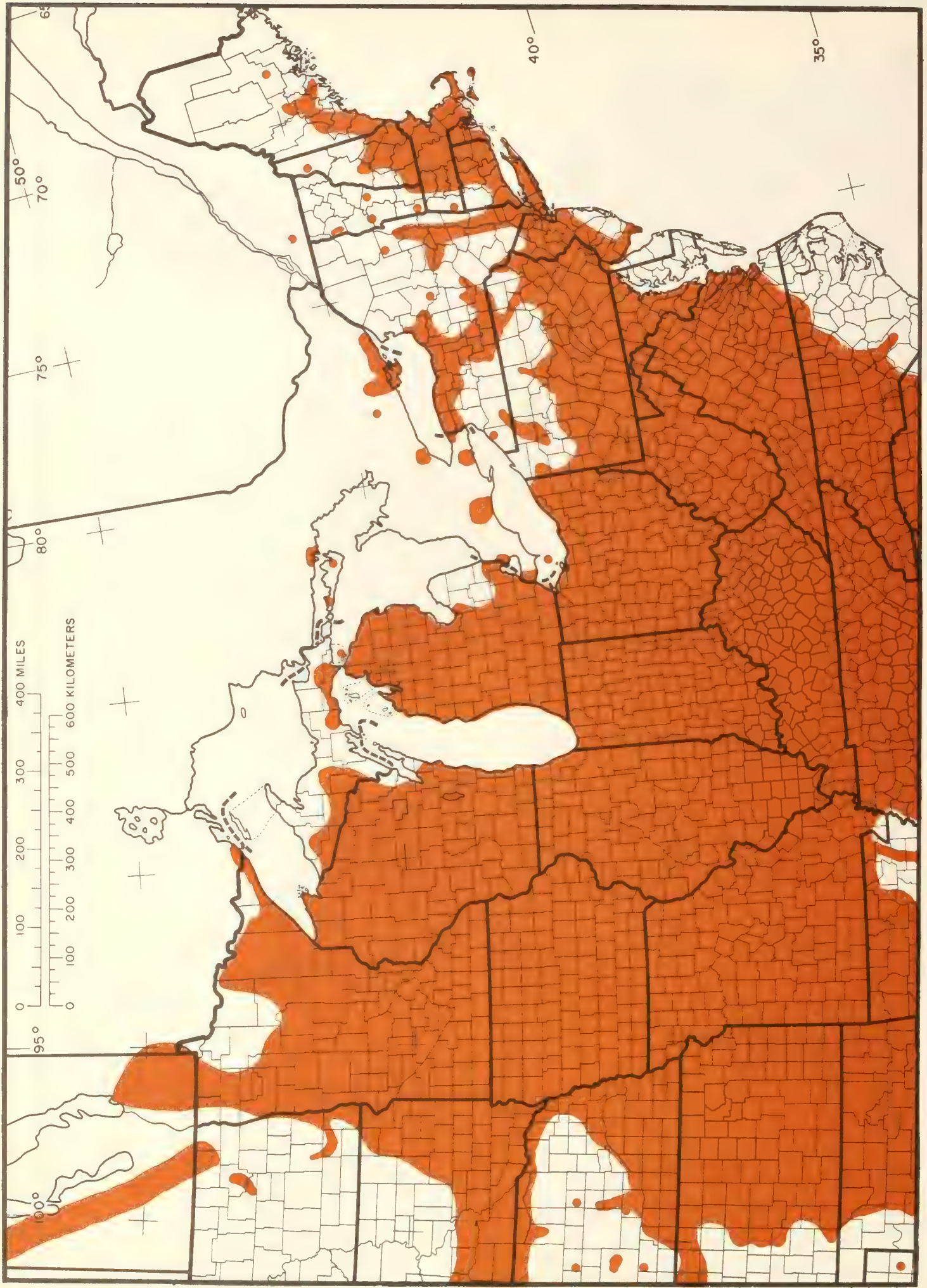
Map 119. *Rhododendron maximum* L. var. *rosechay* rhododendron.



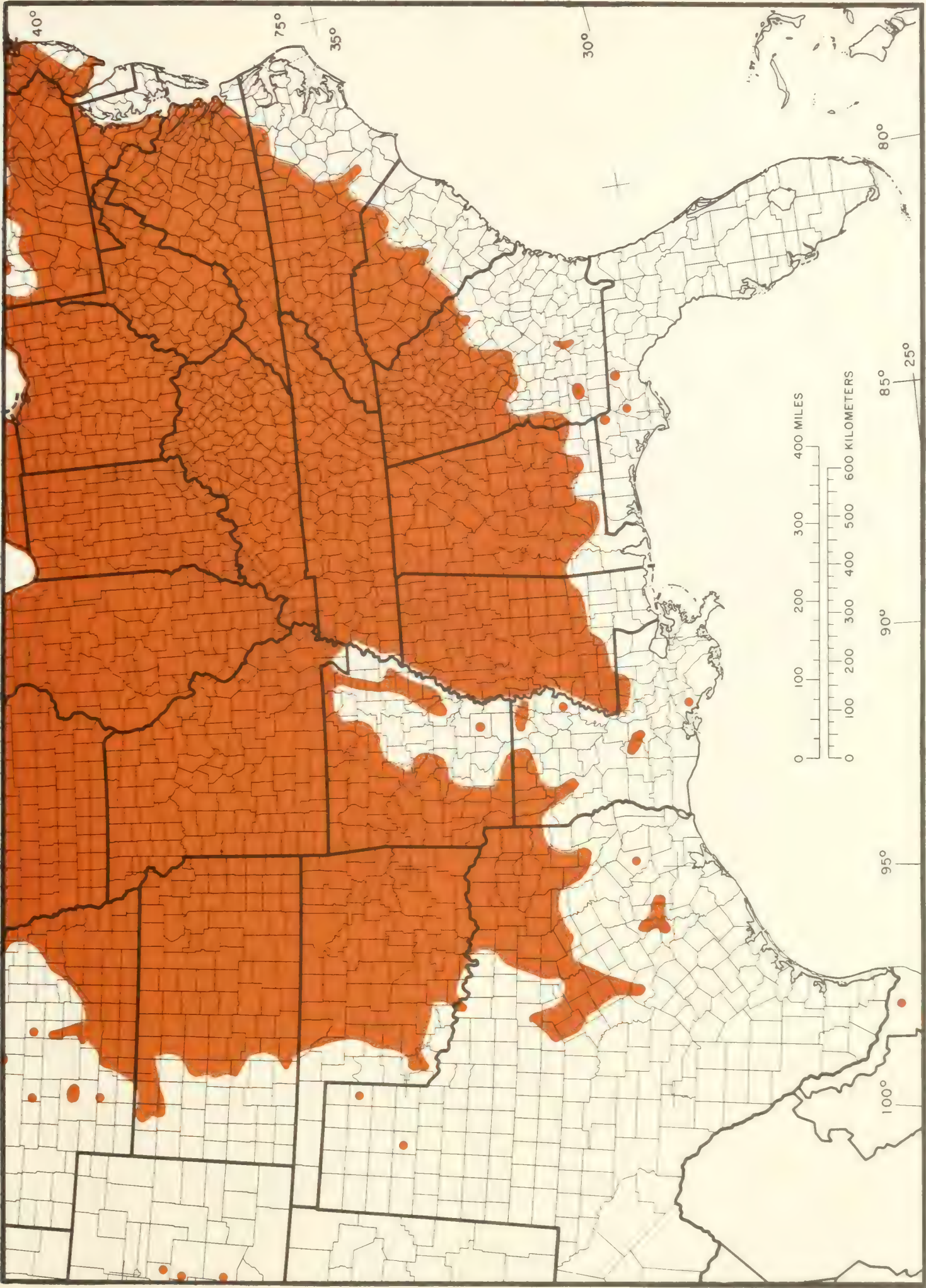
Map 120-N. *Rhus copallina* L., shining sumac.



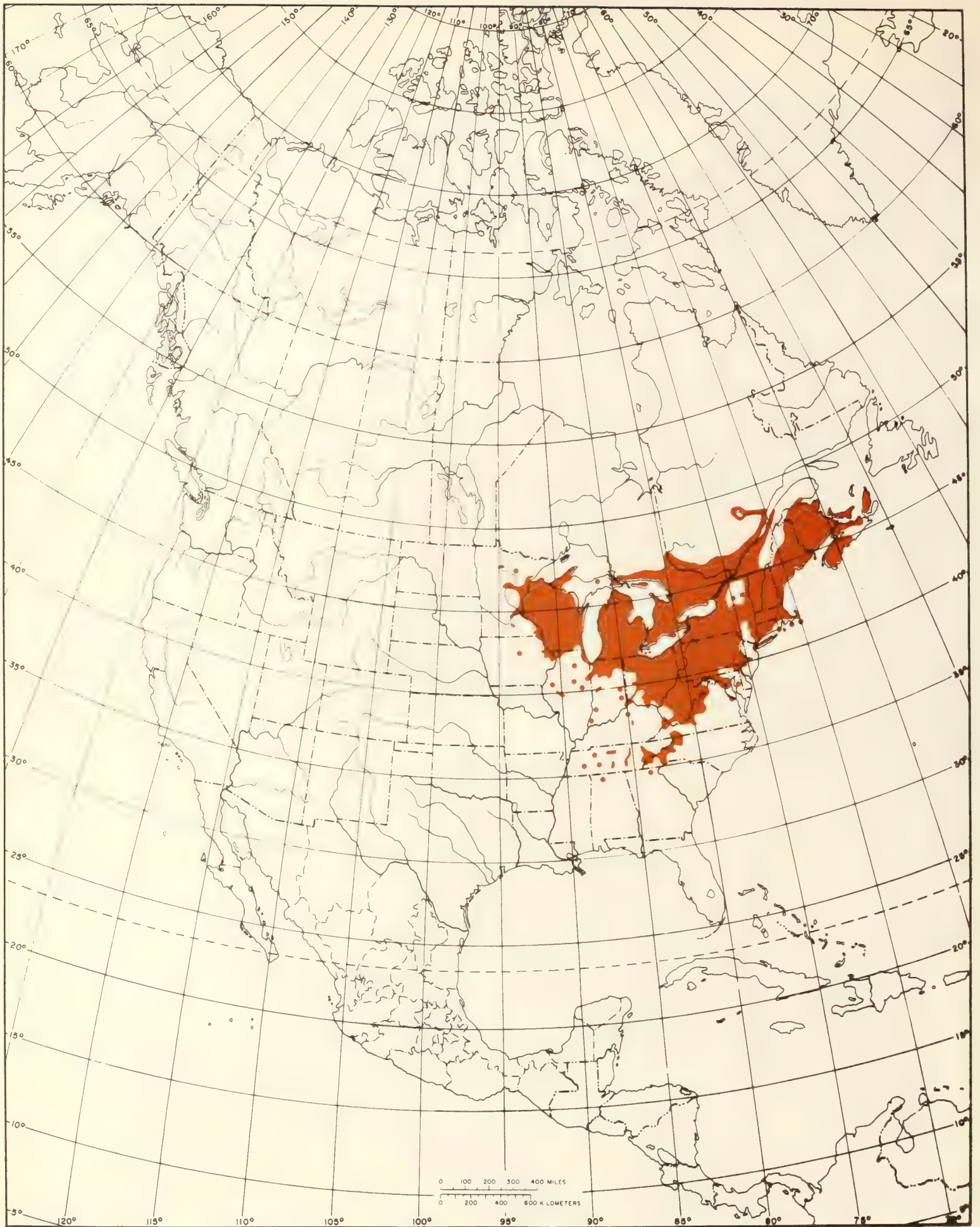
Map 120-SE. *Rhus copallina* L., shining sumac.



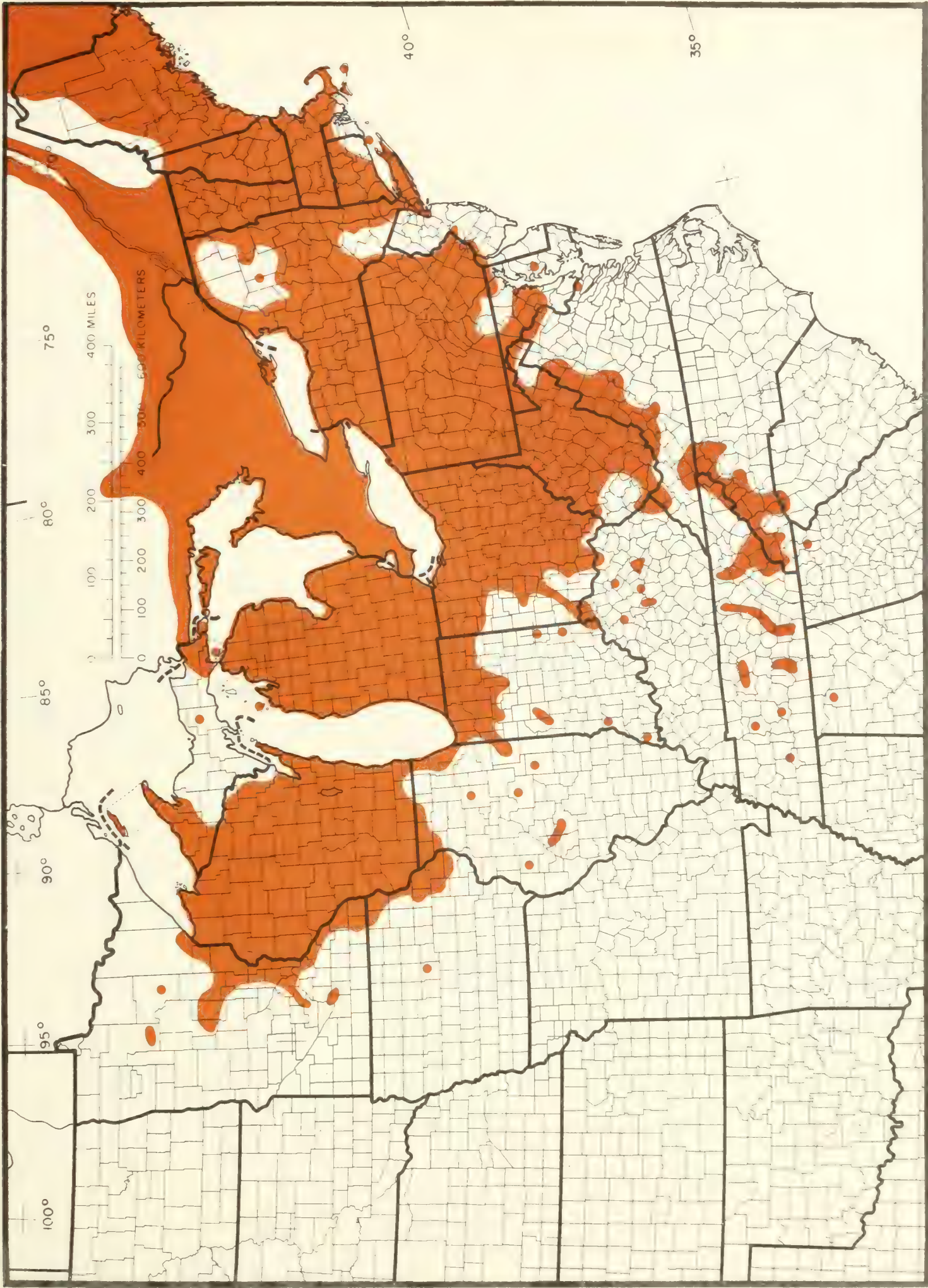
Map 121-NE. *Rhus glabra* L., smooth sumac. Western range in Volume 3.



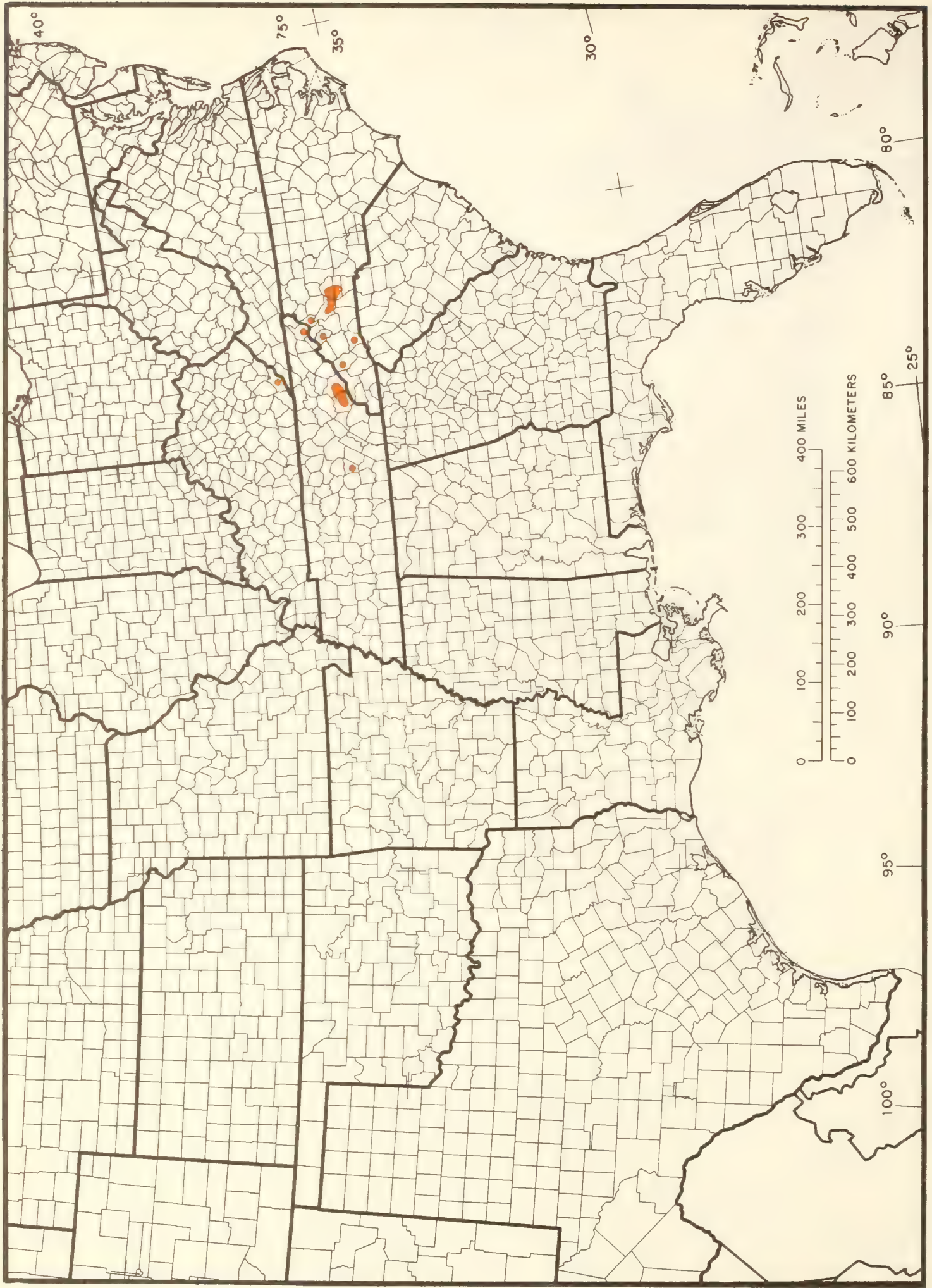
Map 121 SE. *Rhus glabra* L., smooth sumac.



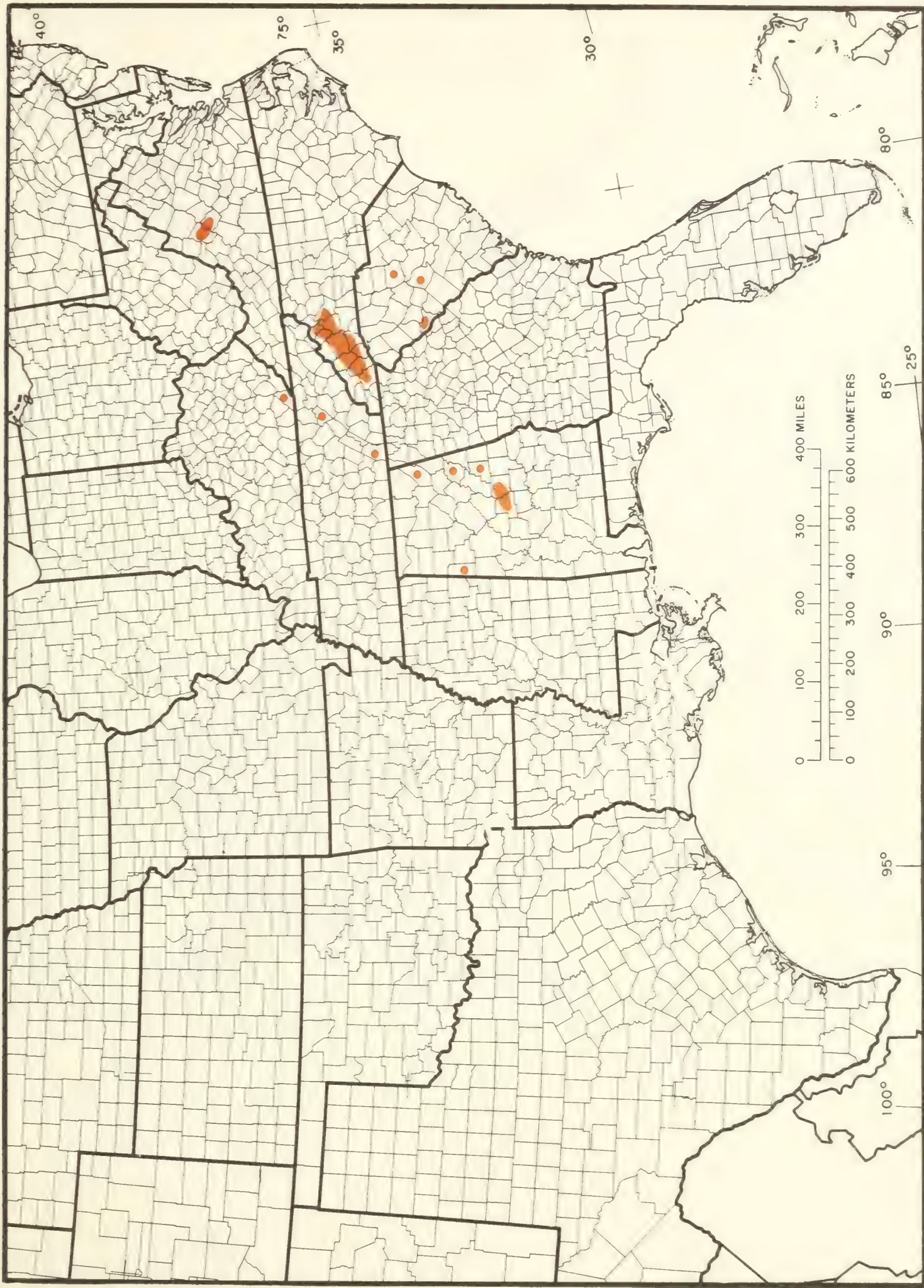
Map 122-N. *Rhus typhina* L., staghorn sumac.



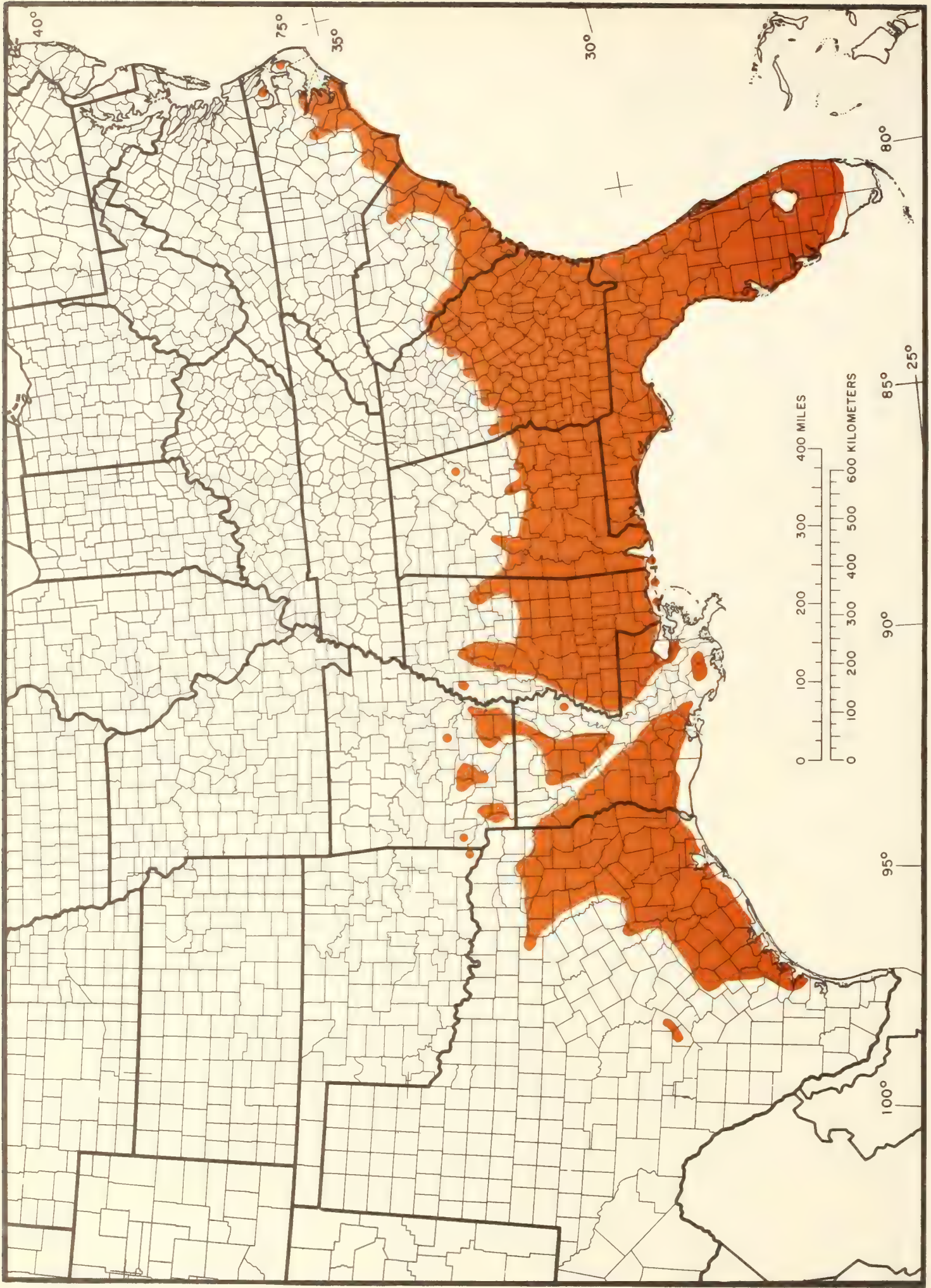
Map 122-NE. *Rhus typhina* L., staghorn sumac.



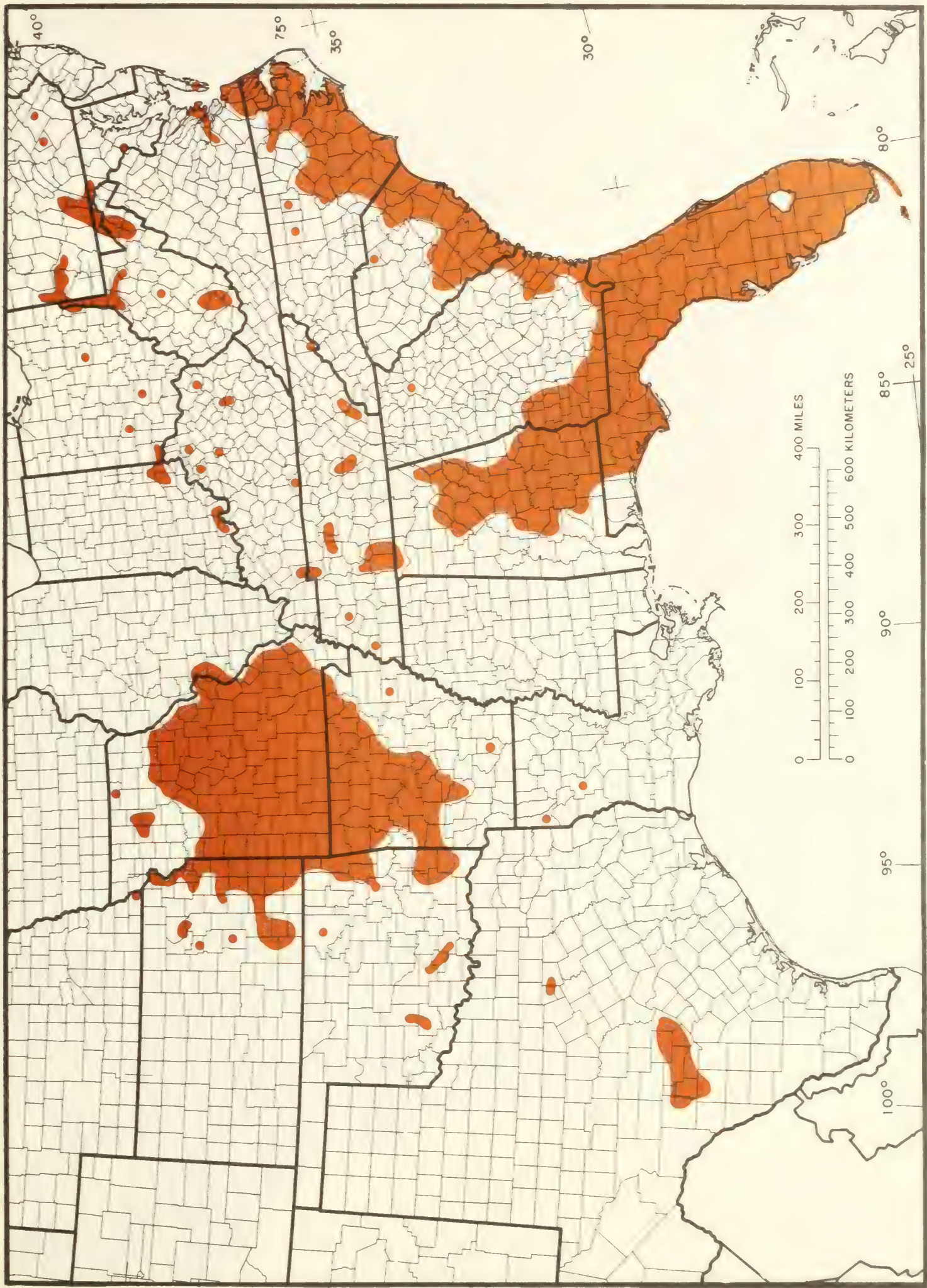
Map 123. *Robinia kelseyi* Hutchins., Kelsey locust. Local in mts. of w. N. C., e. Tenn., and extreme se. Ky.



Map 124. *Robinia viscosa* Vent., clammy locust.



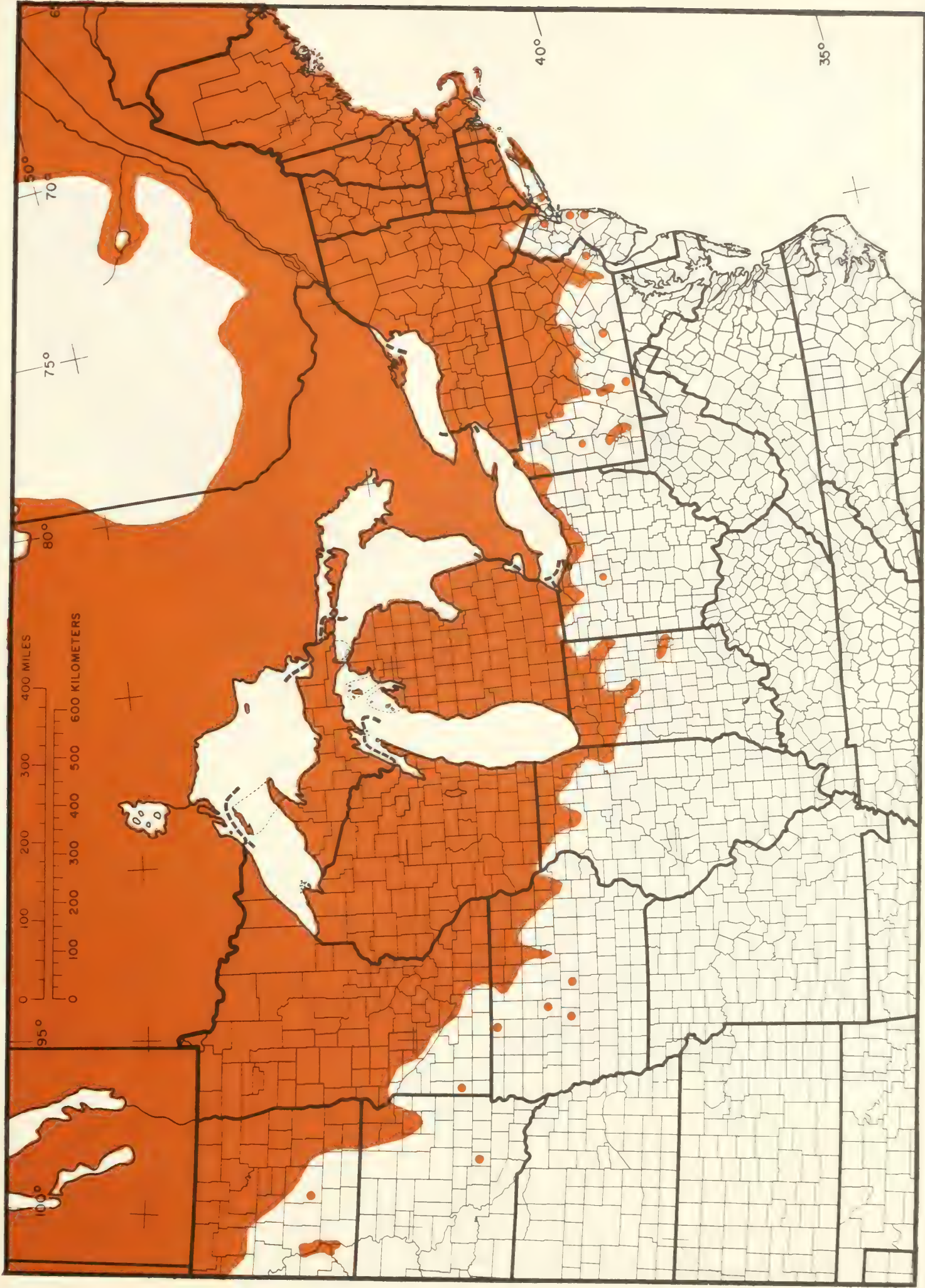
Map 125. *Sabal minor* (Jacq.) Pers., dwarf palmetto.



Map 126. *Salix caroliniana* Michx., Coastal Plain willow. Also Cuba.



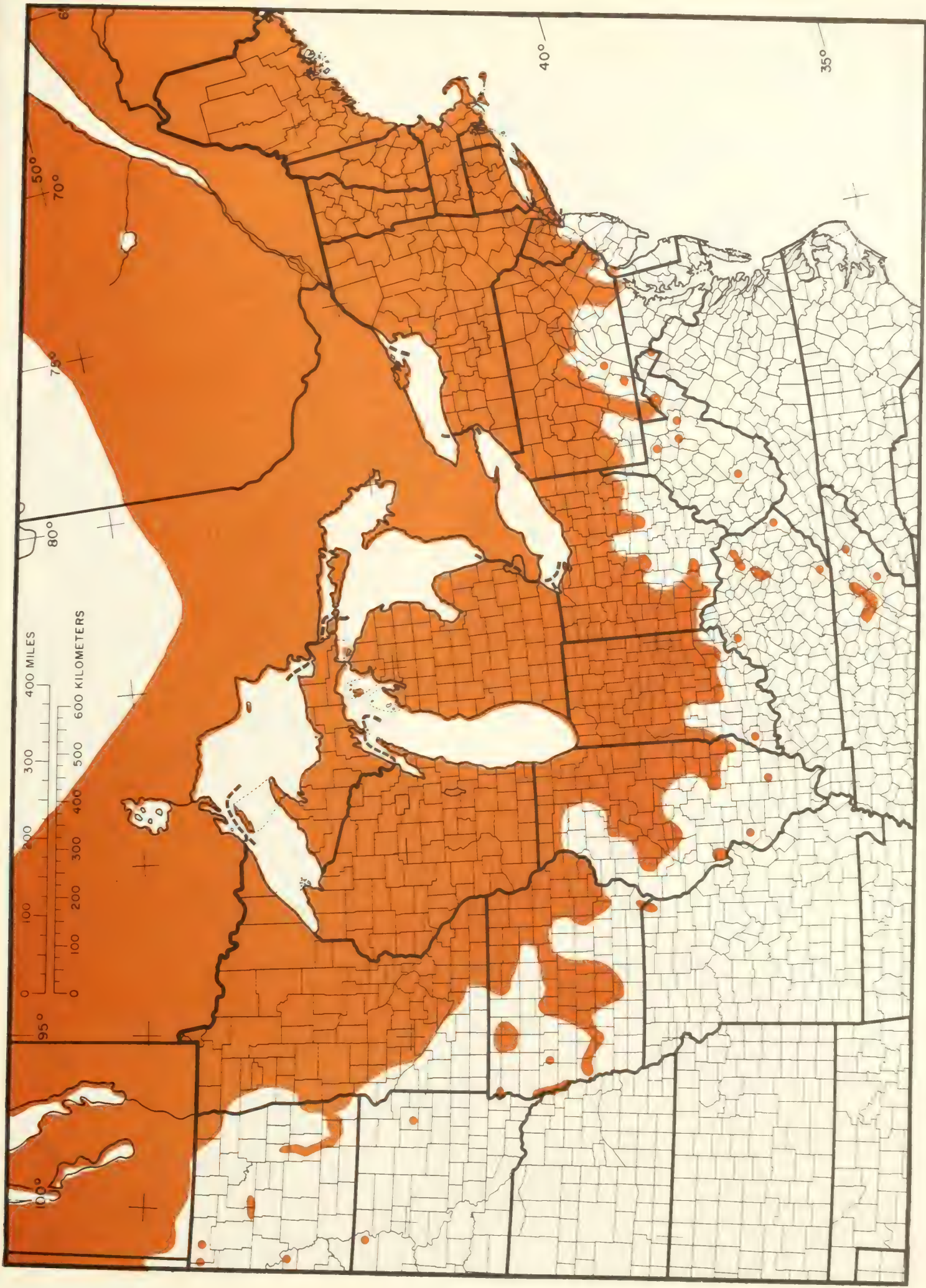
Map 127-N. *Salix bebbiana* Sarg., Bebb willow.



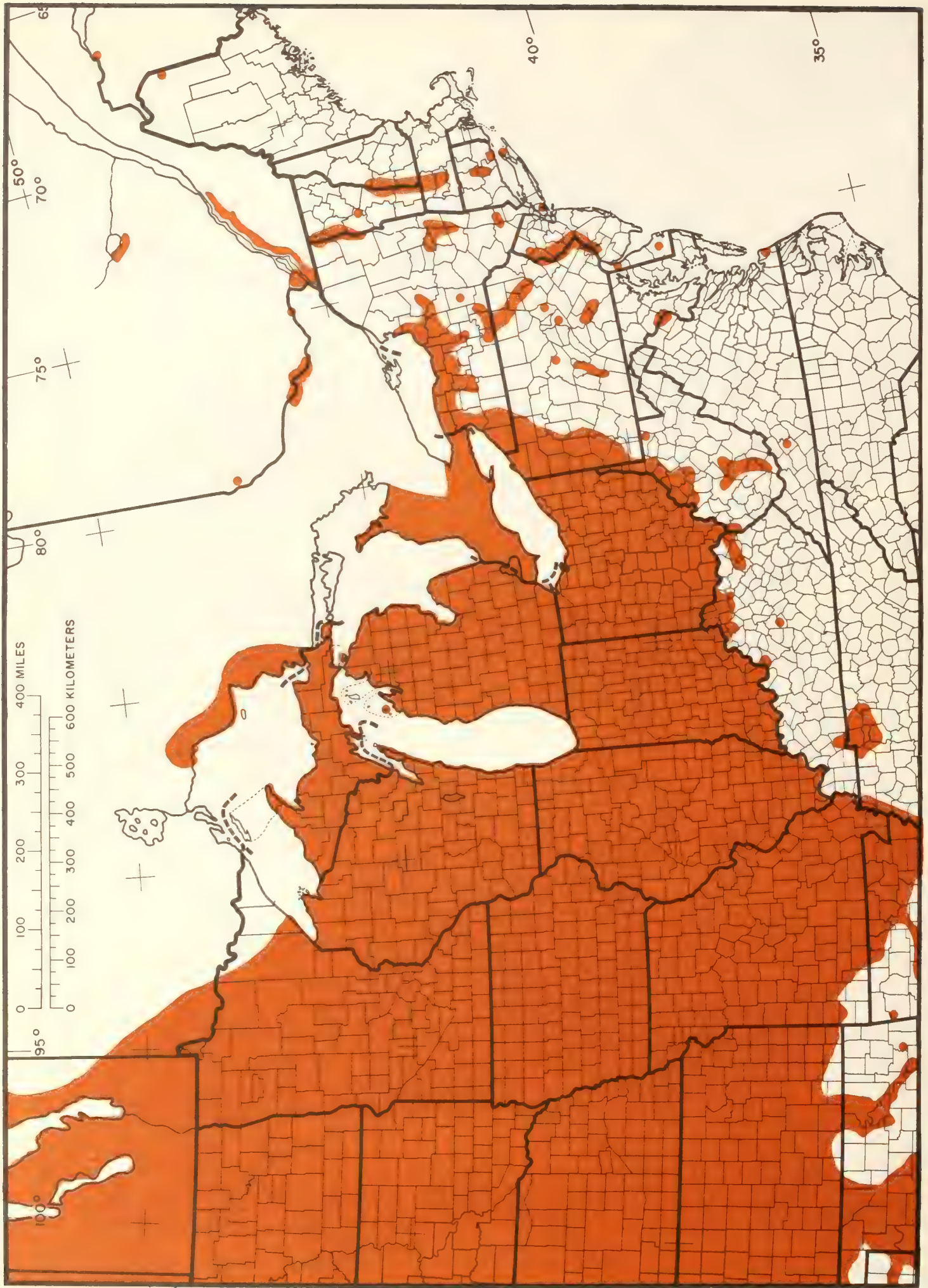
Map 127 N.E. *Salix bebbiana* Sarg., Bebb willow. Western range in Volume 3. Also ne. Asia.



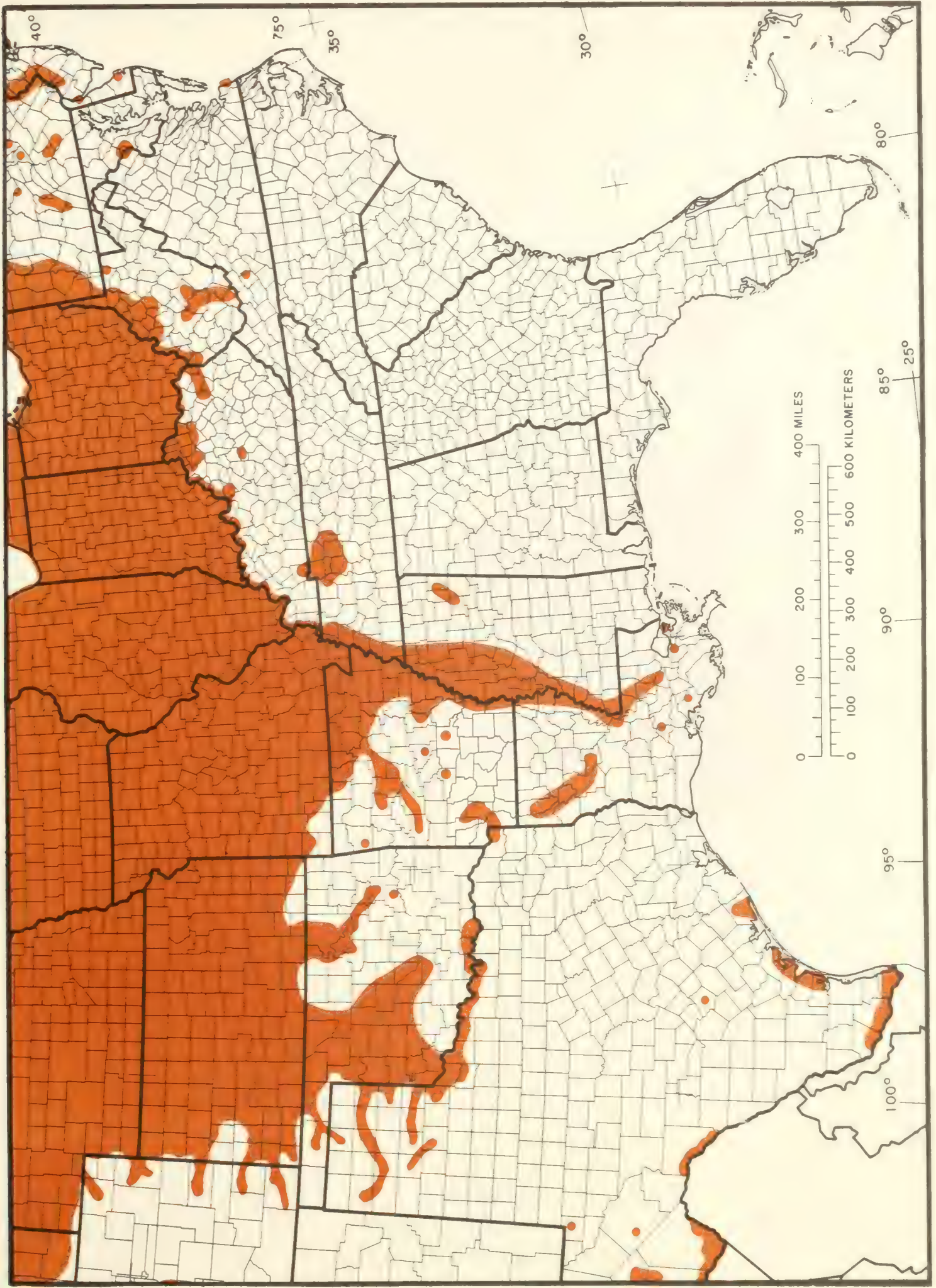
Map 128-N. *Salix discolor* Mühl., pussy willow.



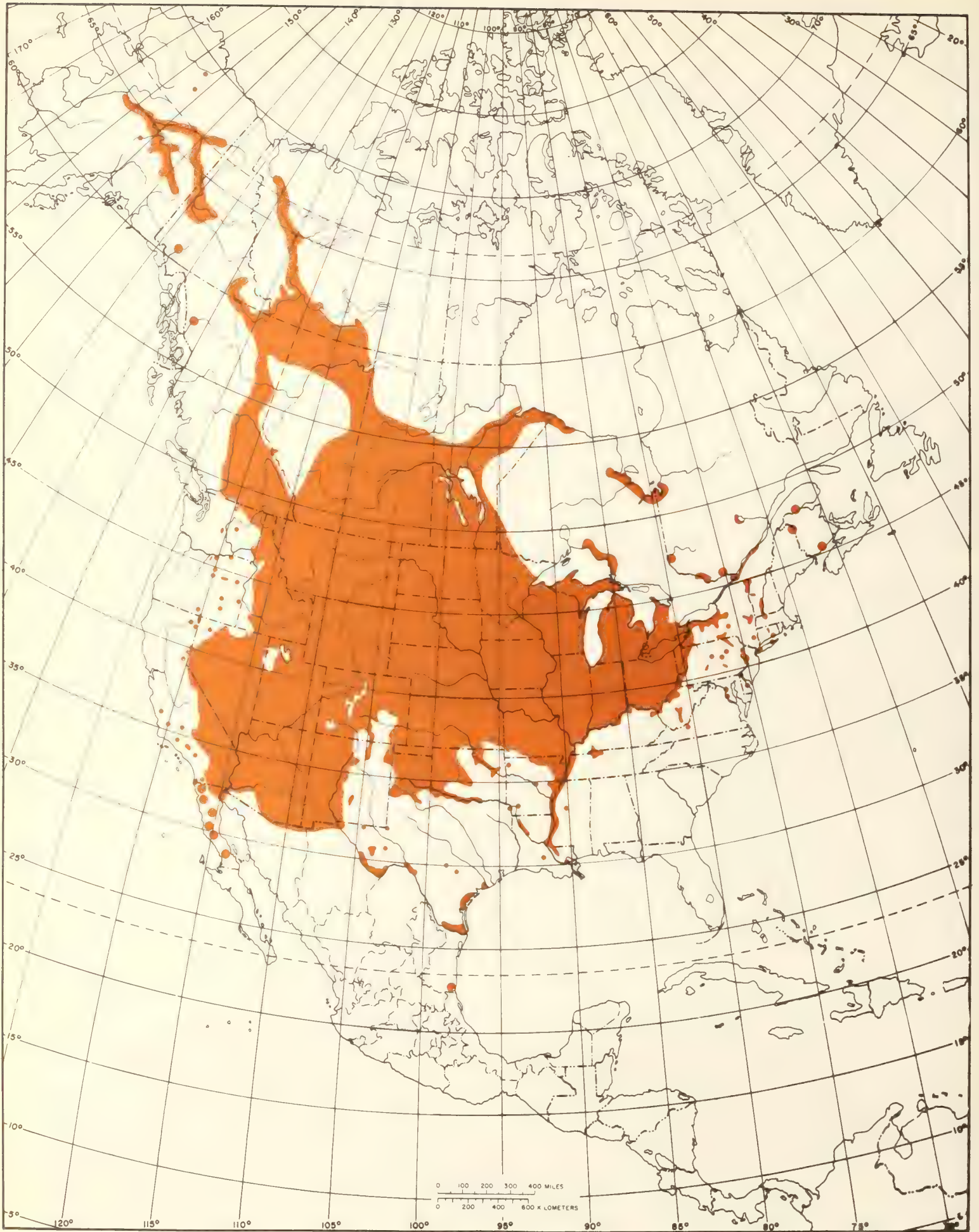
Map 123 N.E. *Salix discolor* Muhl., pussy willow. Western range in Volume 3.



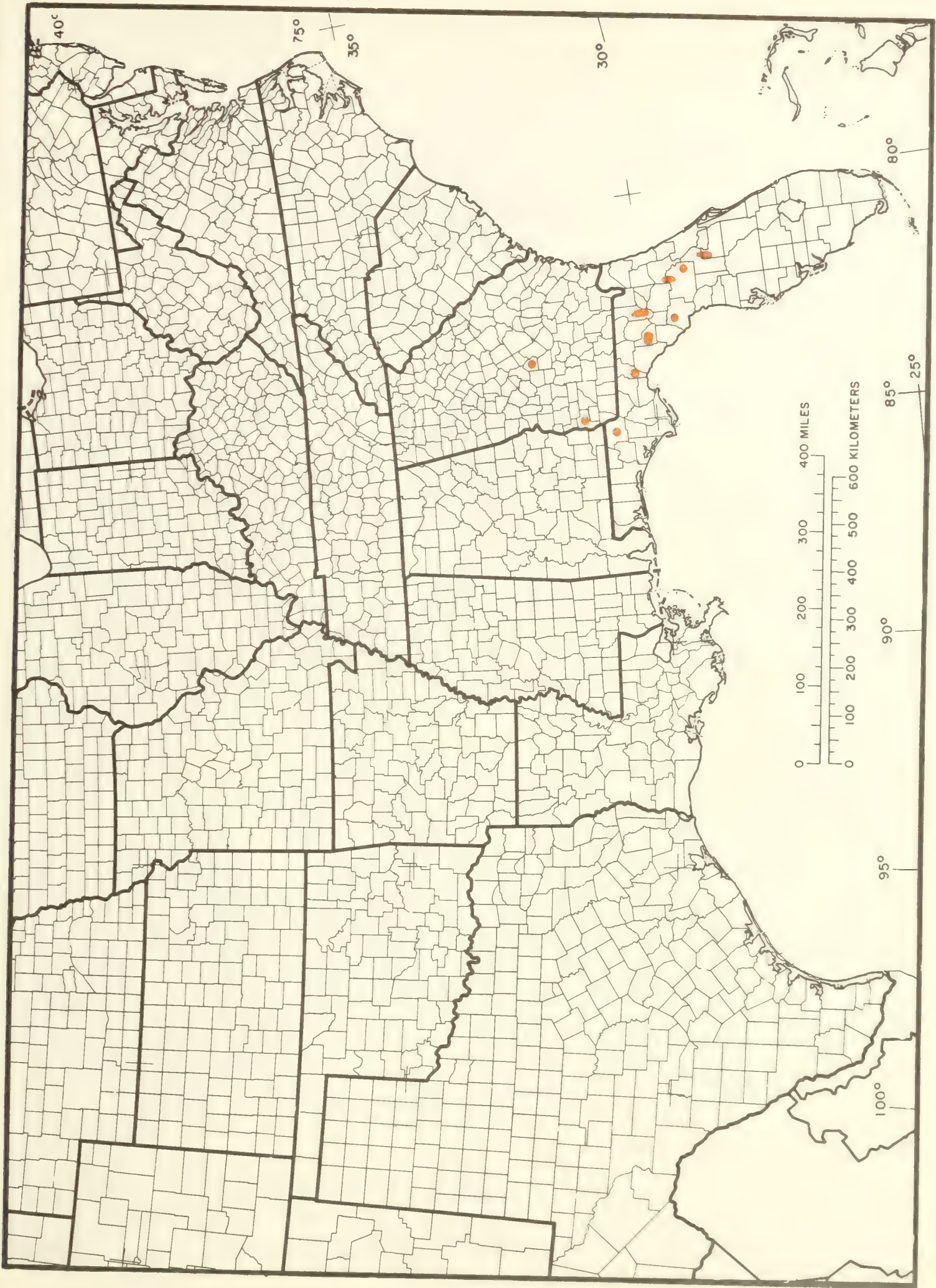
Map 129-NF. *Salix exigua* Nutt., coyote willow. Western range in Volume 3.



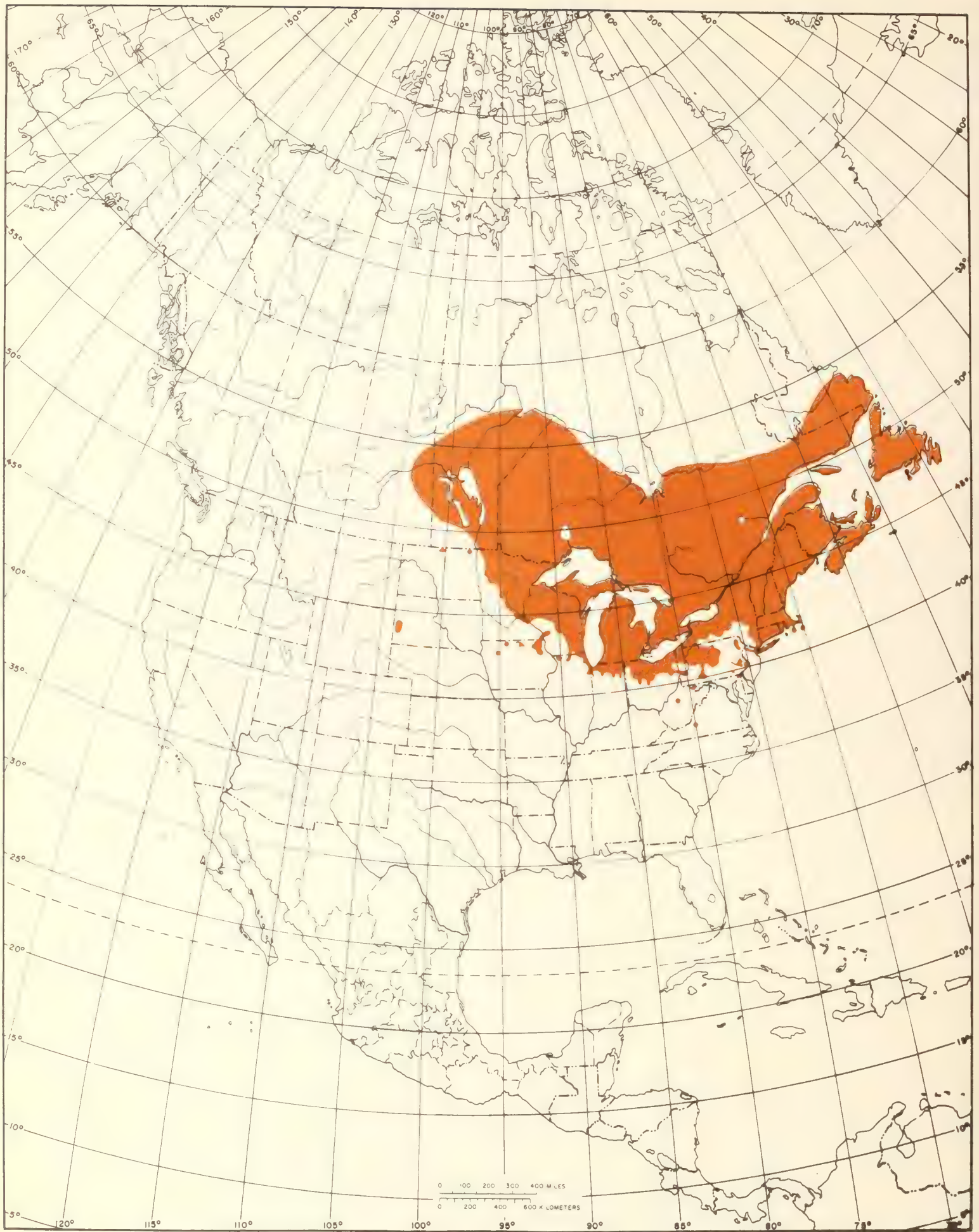
Map 129 SE. *Salix exigua* Nutt., coyote willow. Western range in Volume 3.



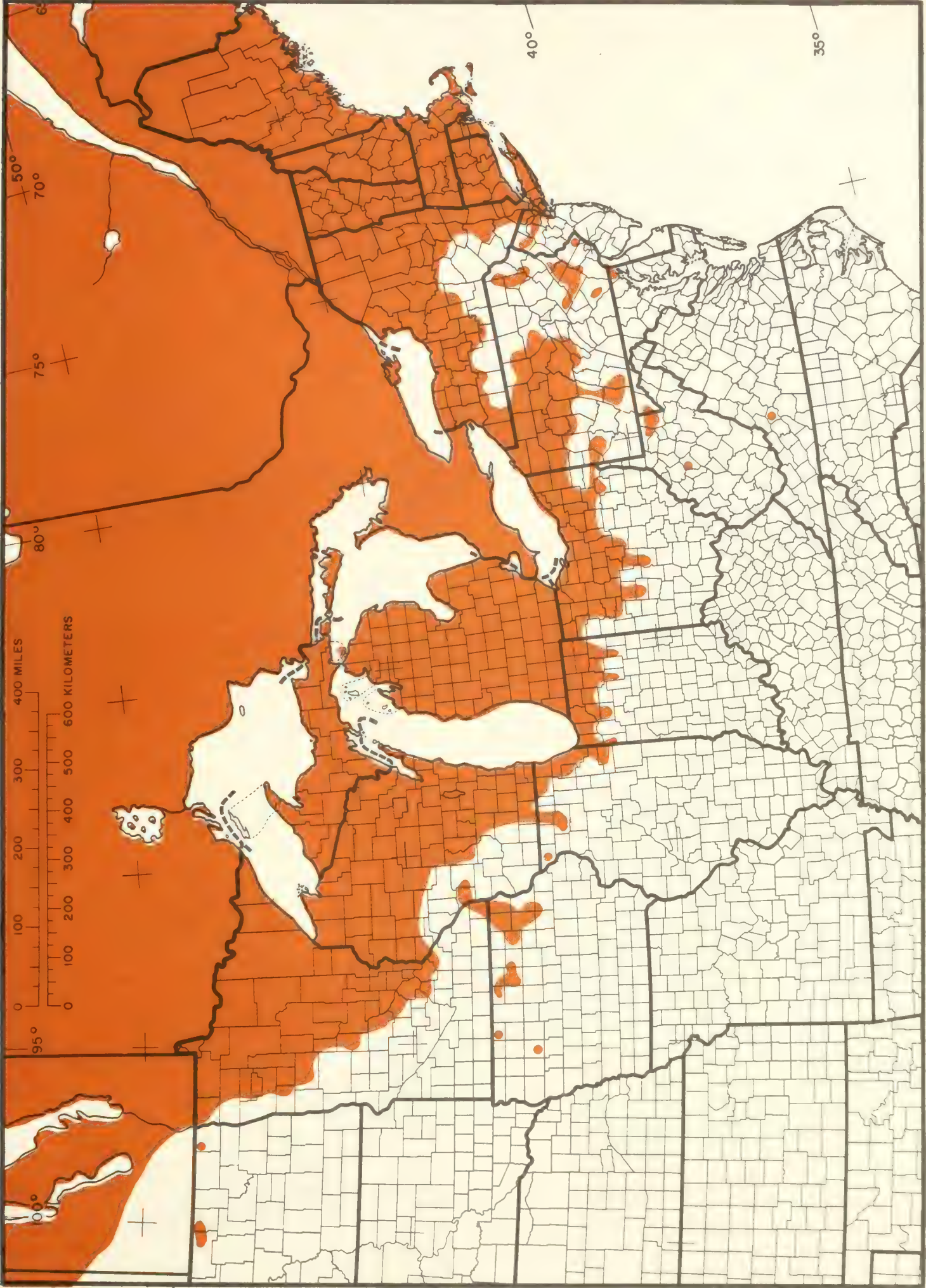
Map 129-N. *Salix exigua* Nutt., coyote willow.



Map 130. *Salix floridana* Chapm., Florida willow. Rare, s. Ga. to nw. and e. Fla.



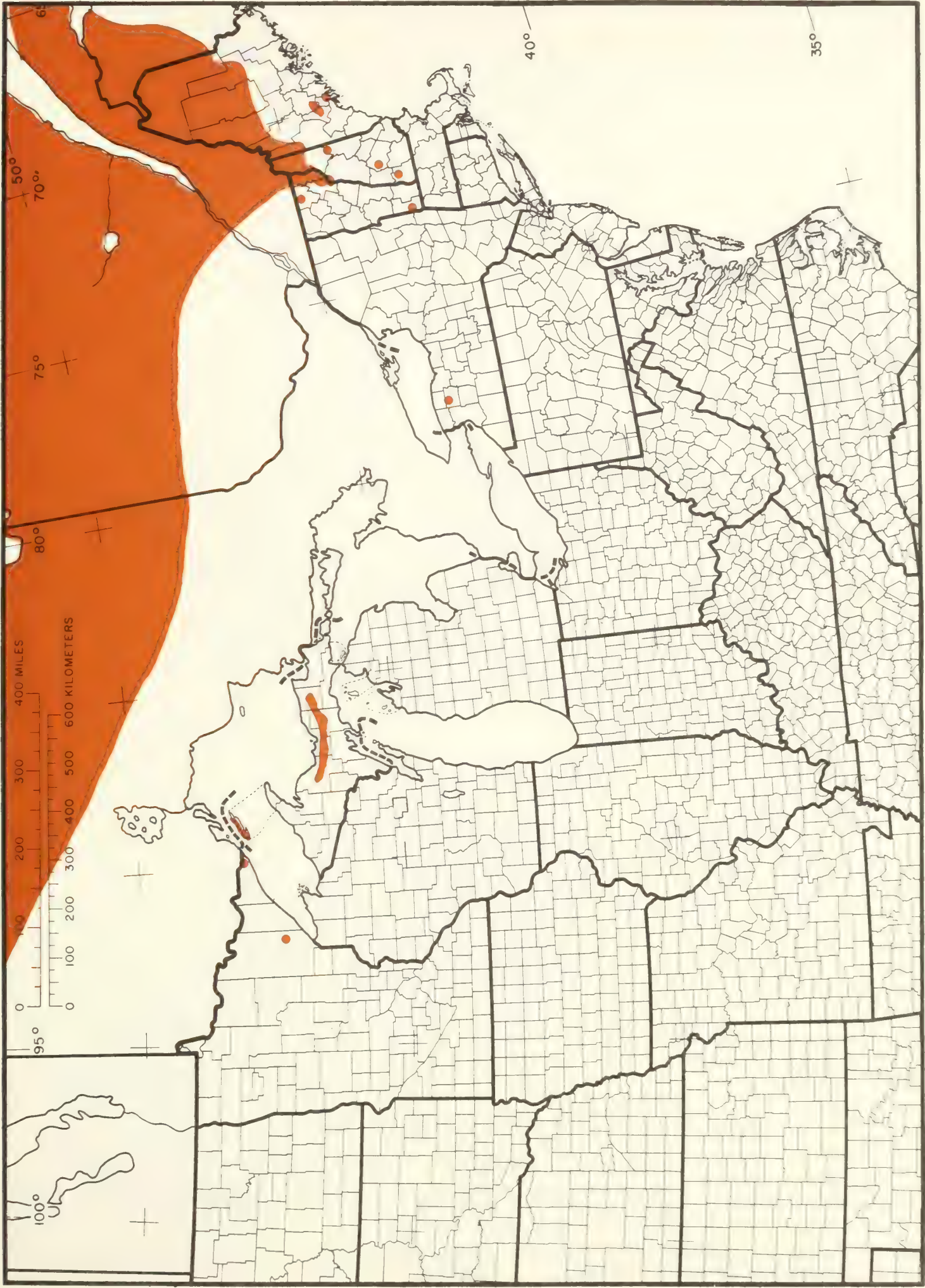
Map 131-N. *Salix lucida* Mühl., shining willow.



Map 131 NE. *Salix lucida* Muhl., shining willow.



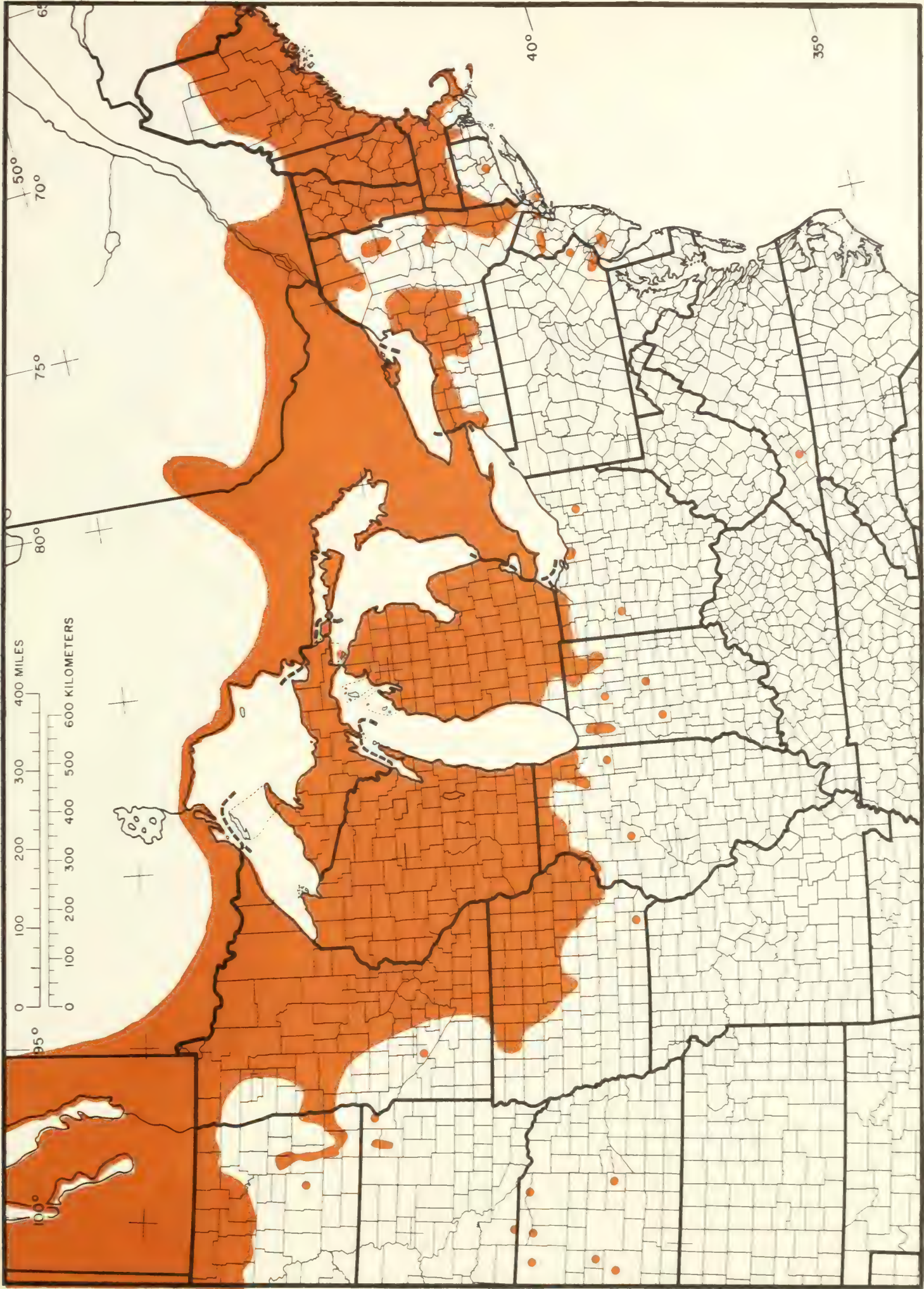
Map 132-N. *Salix pellita* Andersson, satiny willow.



Map 132. NE. *Salix pellita* Anders. ssp. satiny willow.



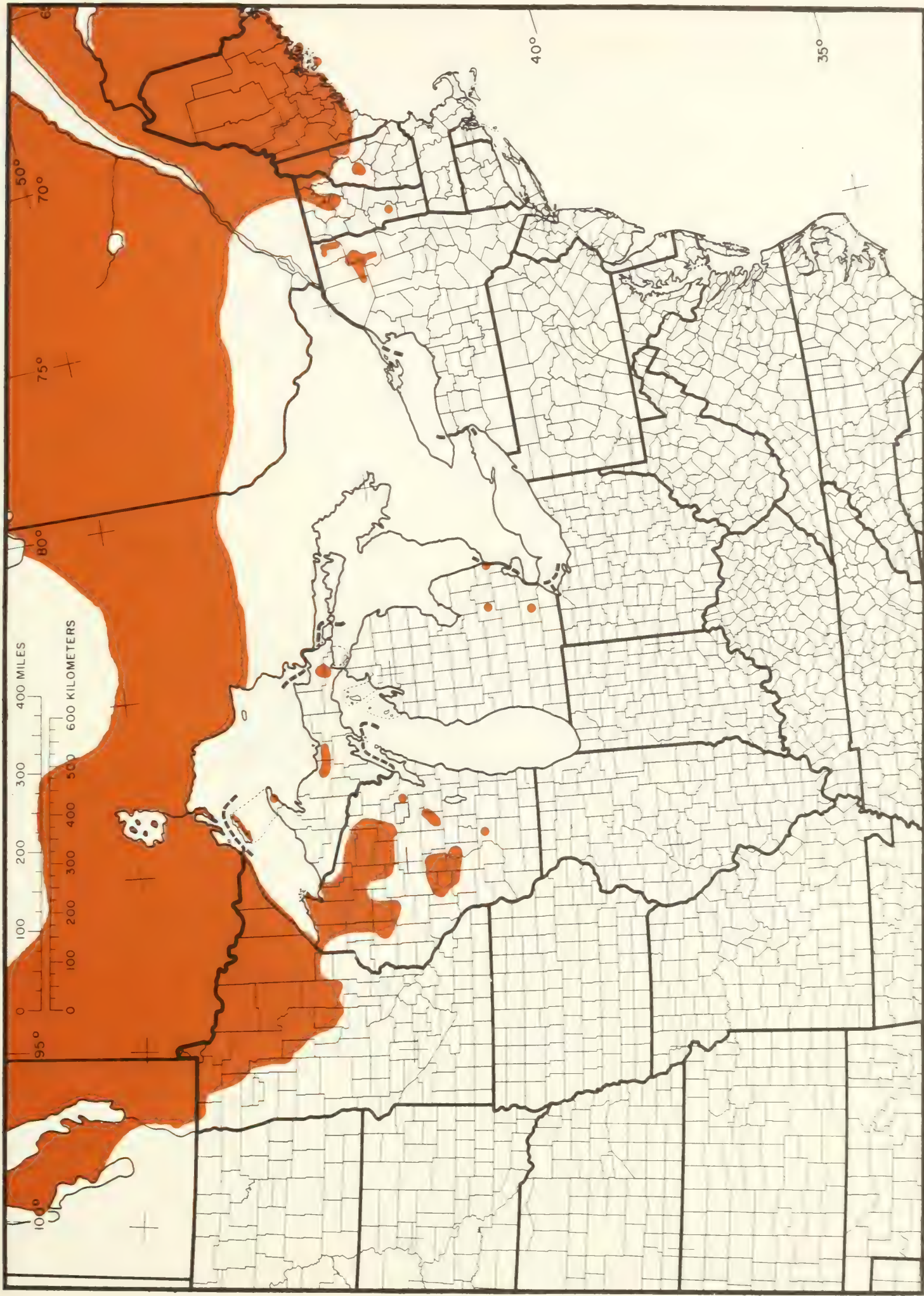
Map 133-N. *Salix petiolaris* J. E. Sm., meadow willow.



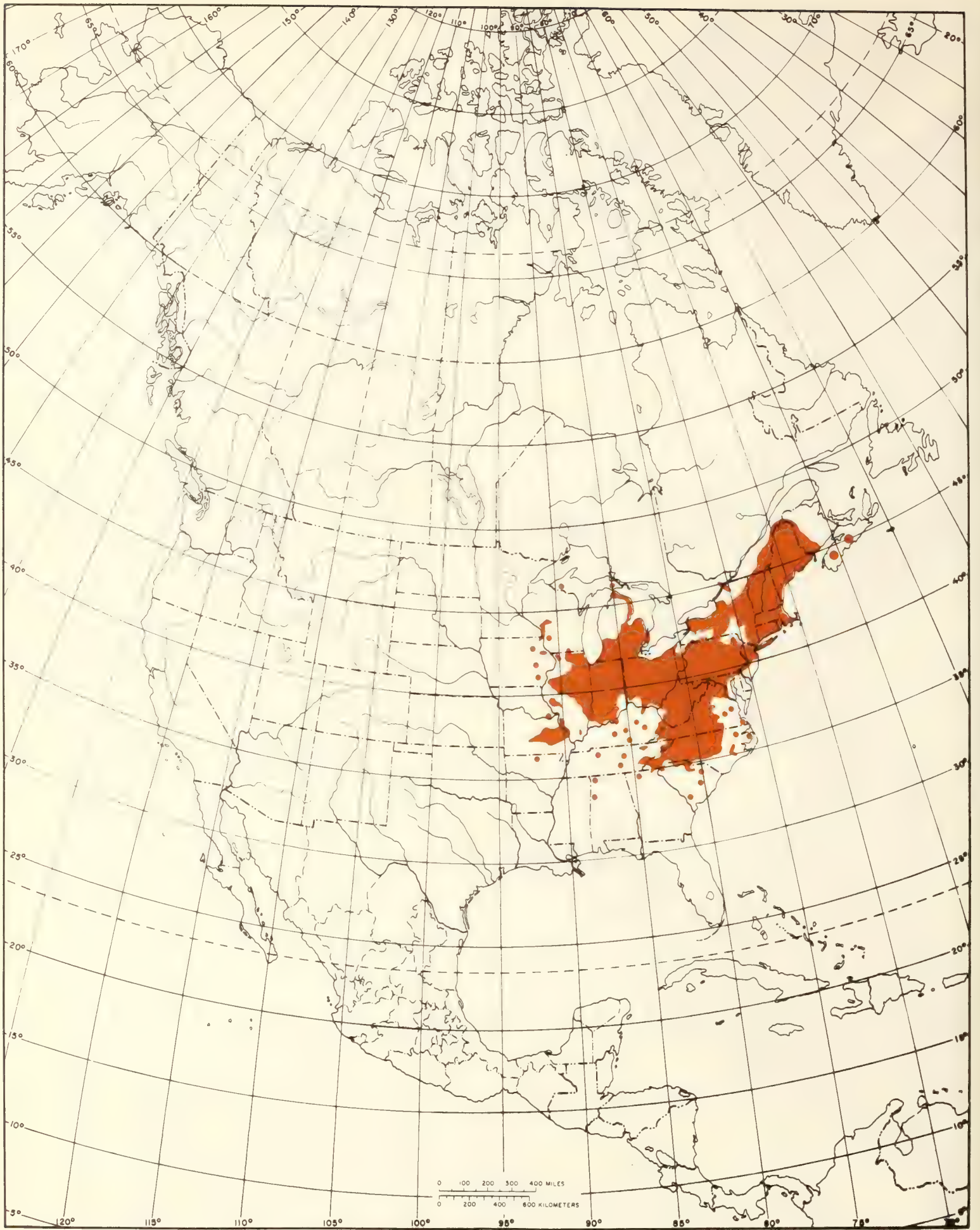
Map 133 NE. *Salix petiolaris* J. E. Sm., meadow willow. Western range in Volume 3.



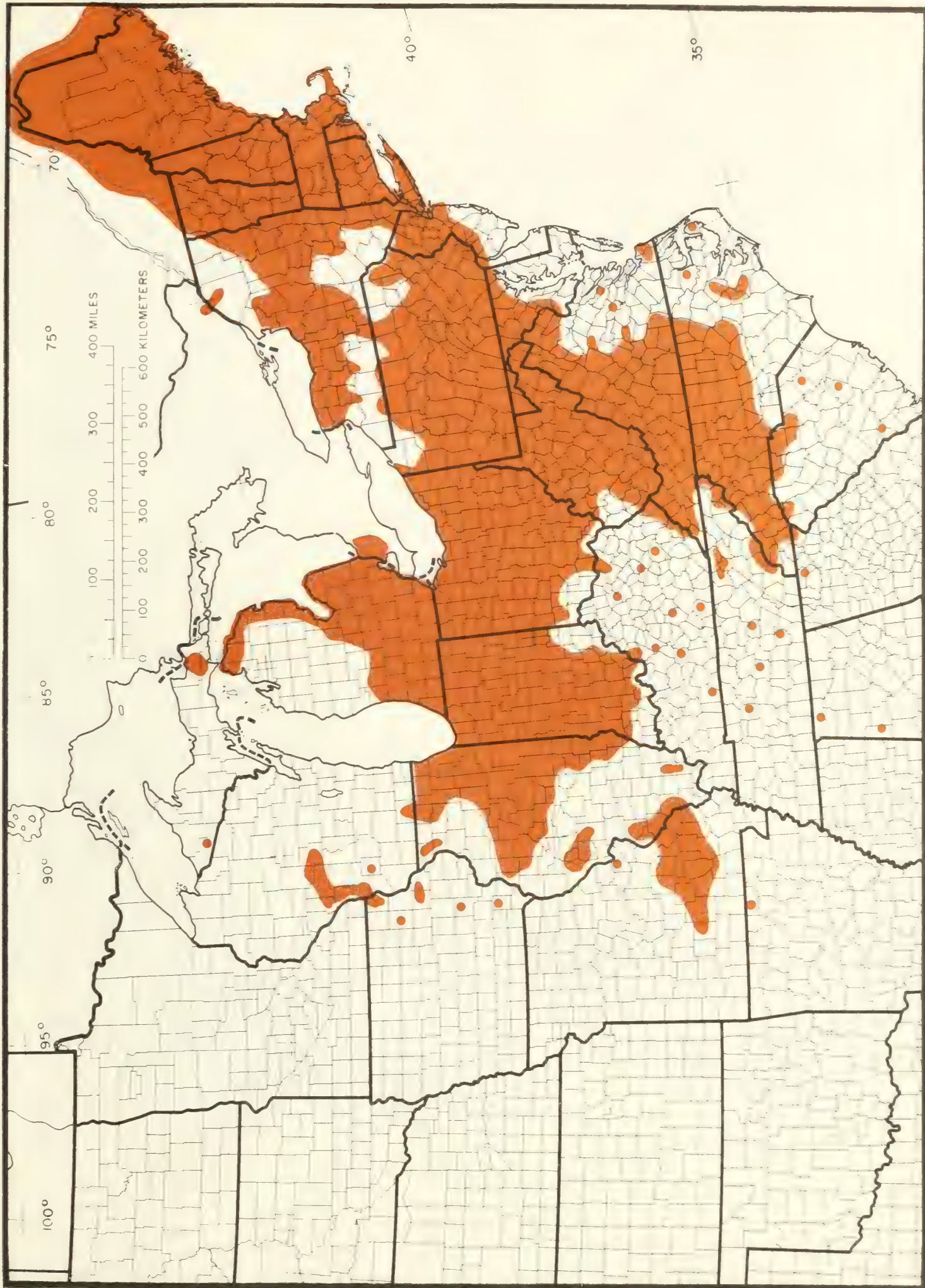
Map 134-N. *Salix pyrifolia* Anderss., balsam willow.



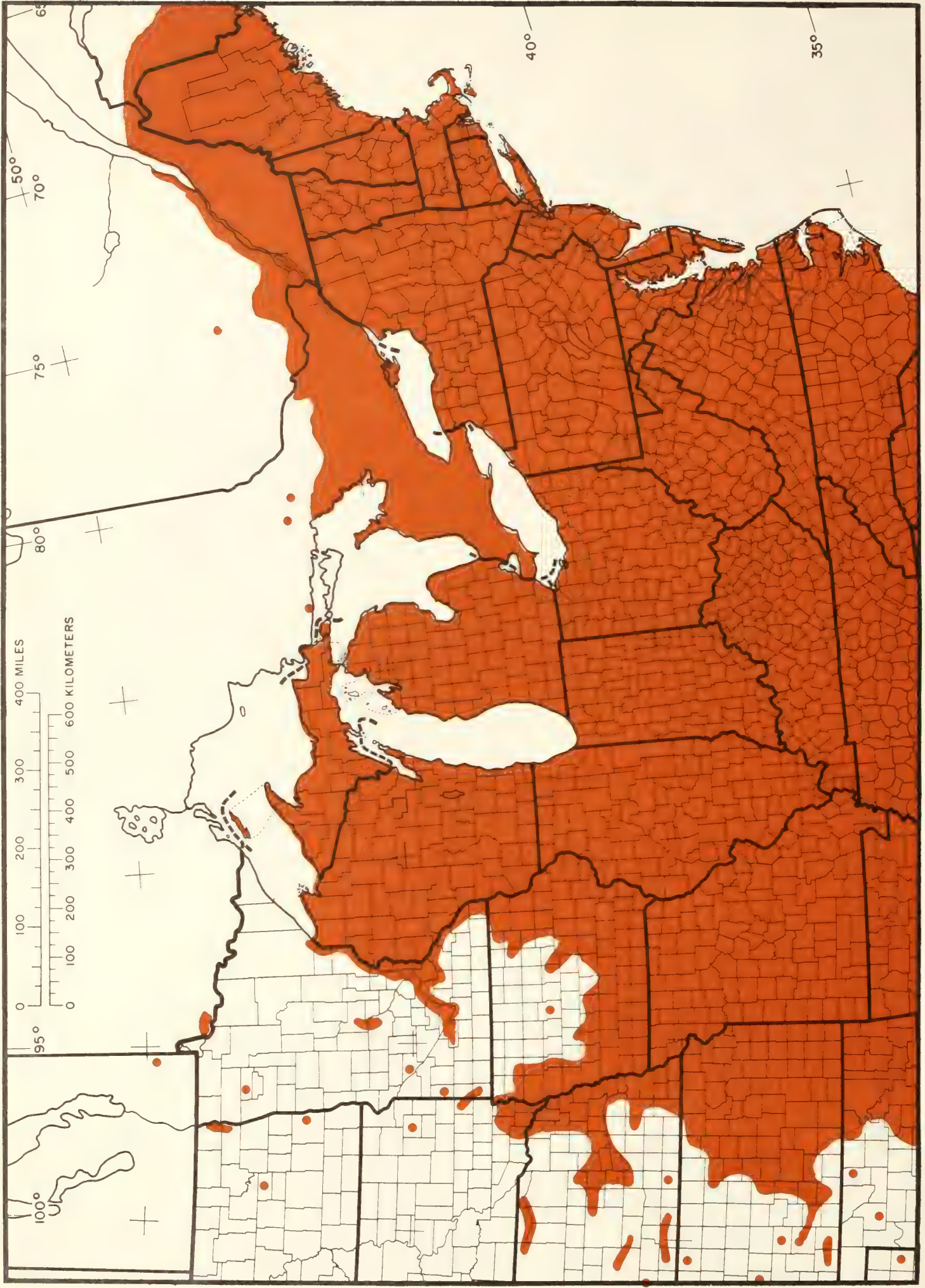
Map 134-NB. *Salix pyrifolia* Anderss., balsam willow.



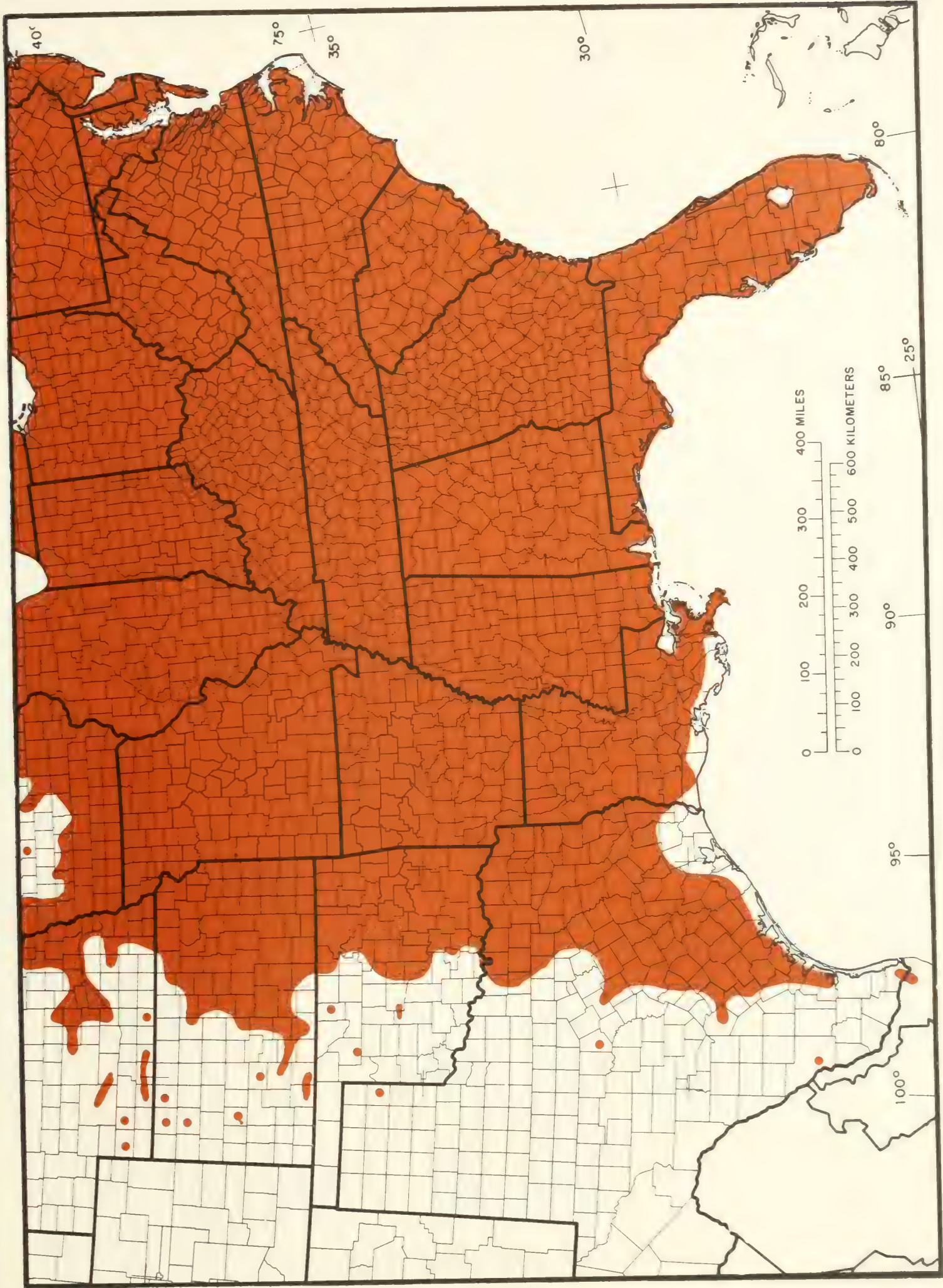
Map 135-N. *Salix sericea* Marsh., silky willow.



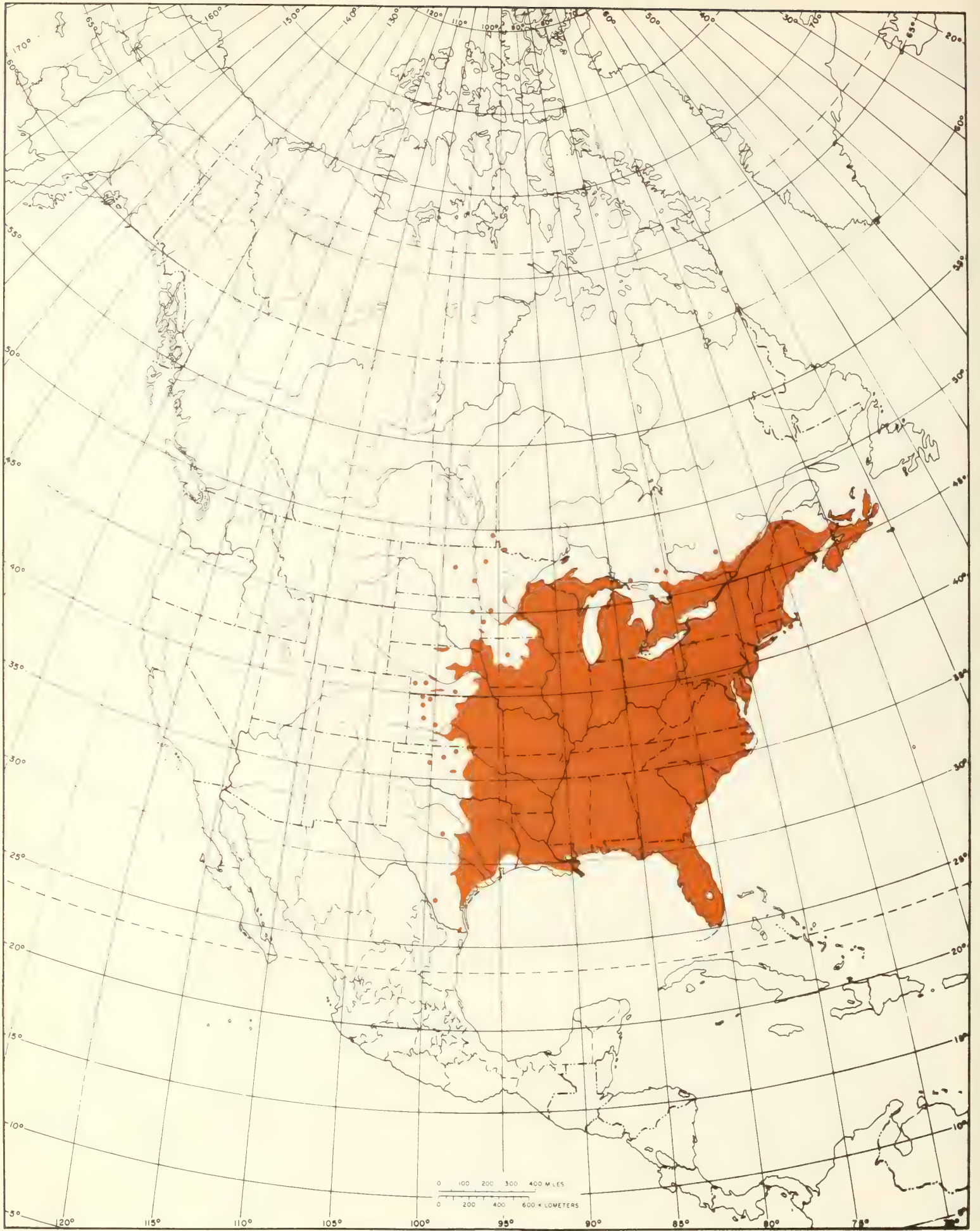
Map 135 NE. *Salix sericea* Marsh., silky willow.



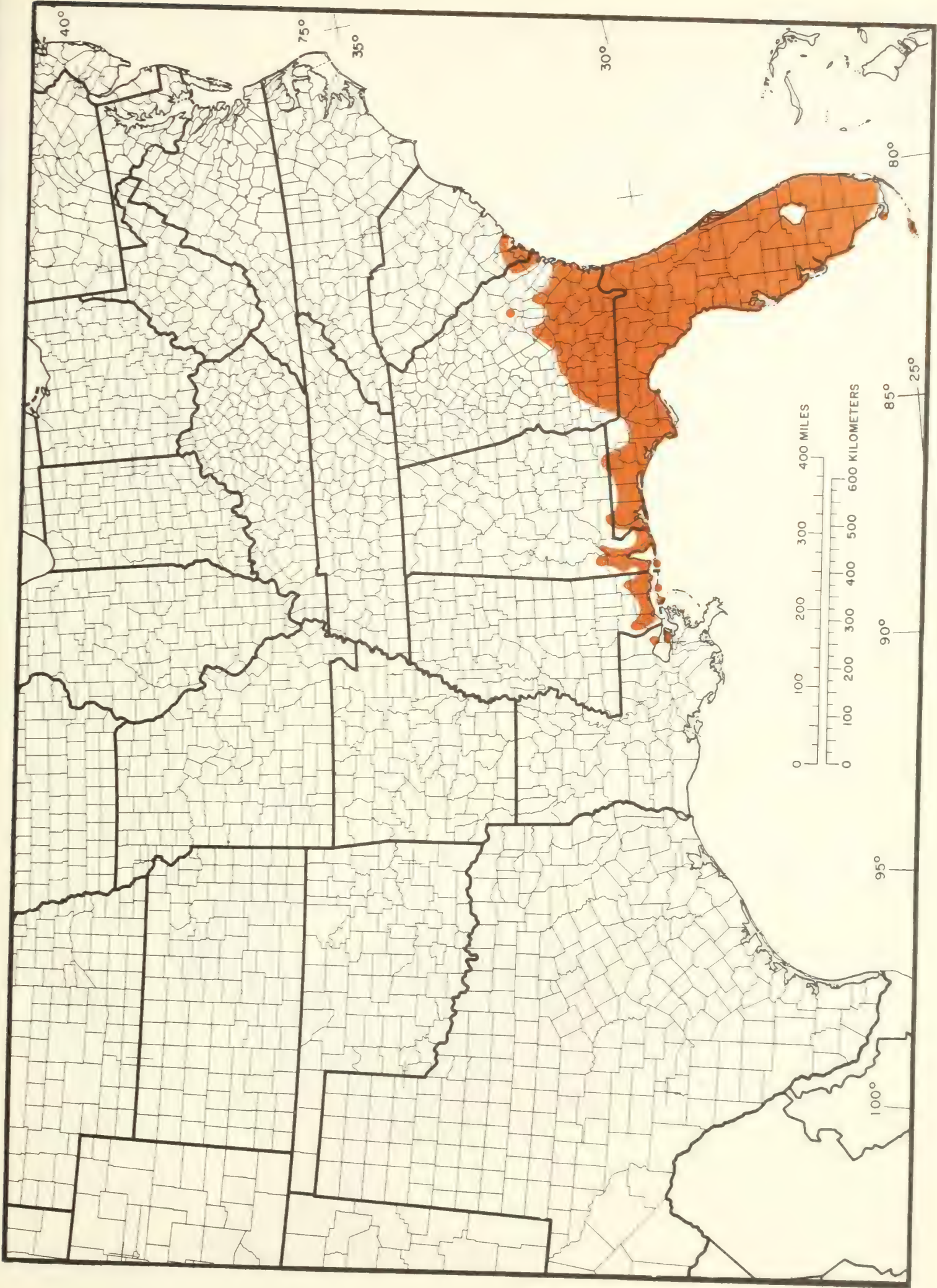
Map 136-NE. *Sambucus canadensis* L., American elder.



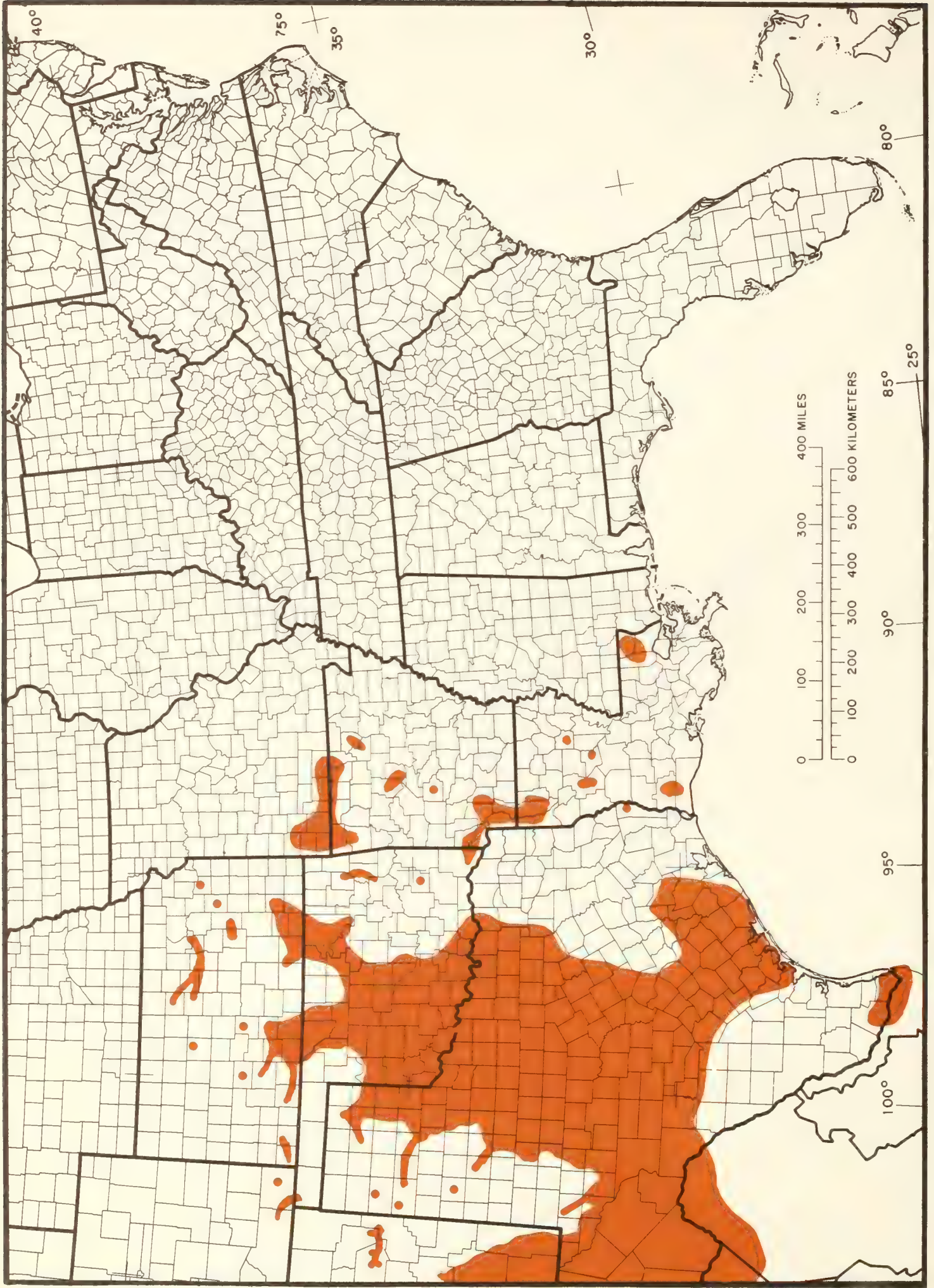
Map 136-SE. *Sambucus canadensis* L., American elder.



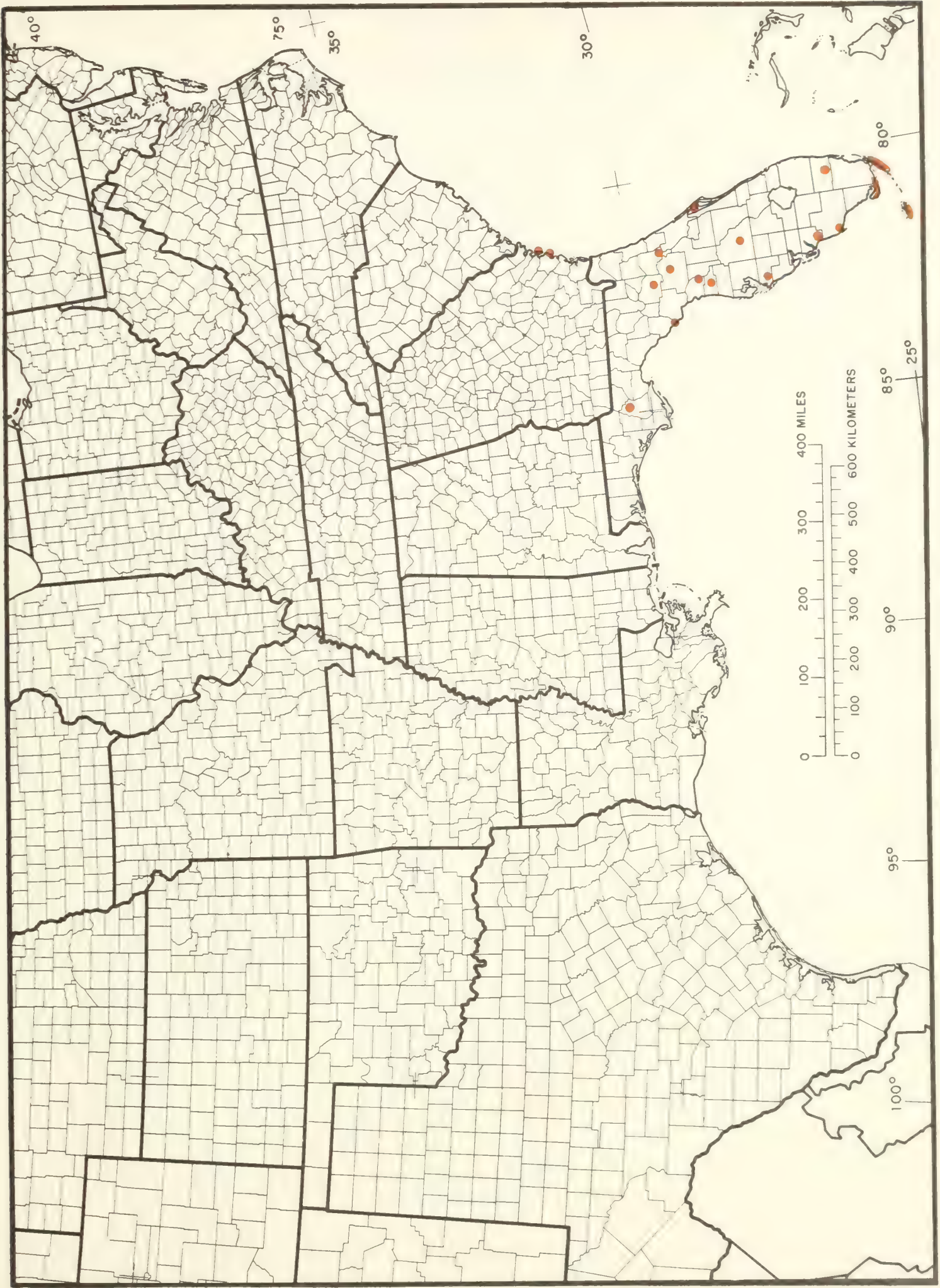
Map 136-N. *Sambucus canadensis* L., American elder.



Map 137. *Serenoa repens* (Bartr.) Small, saw-palmetto.



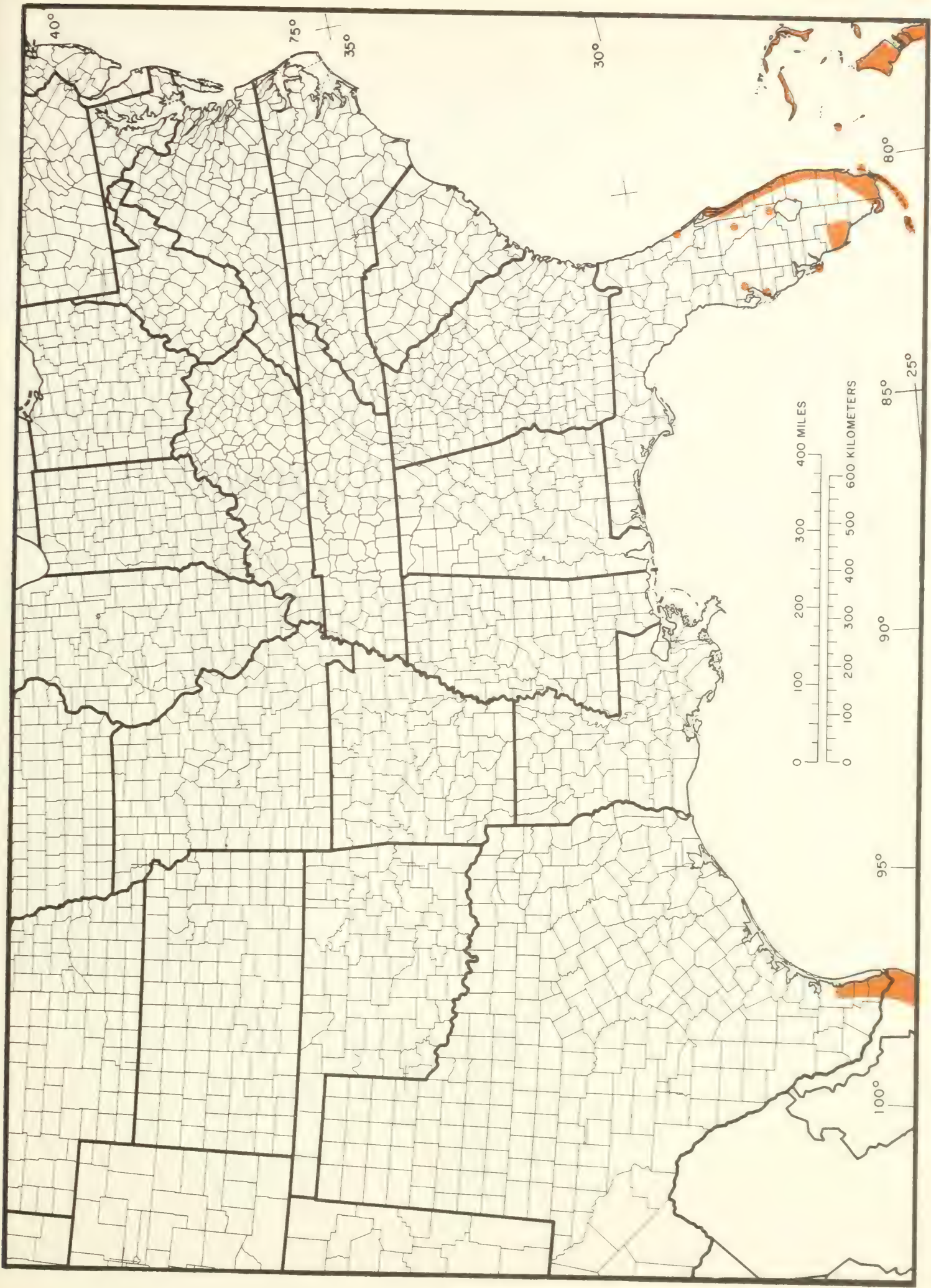
Map 138. *Sapindus drummondii* Hook. & Arn., western soapberry.



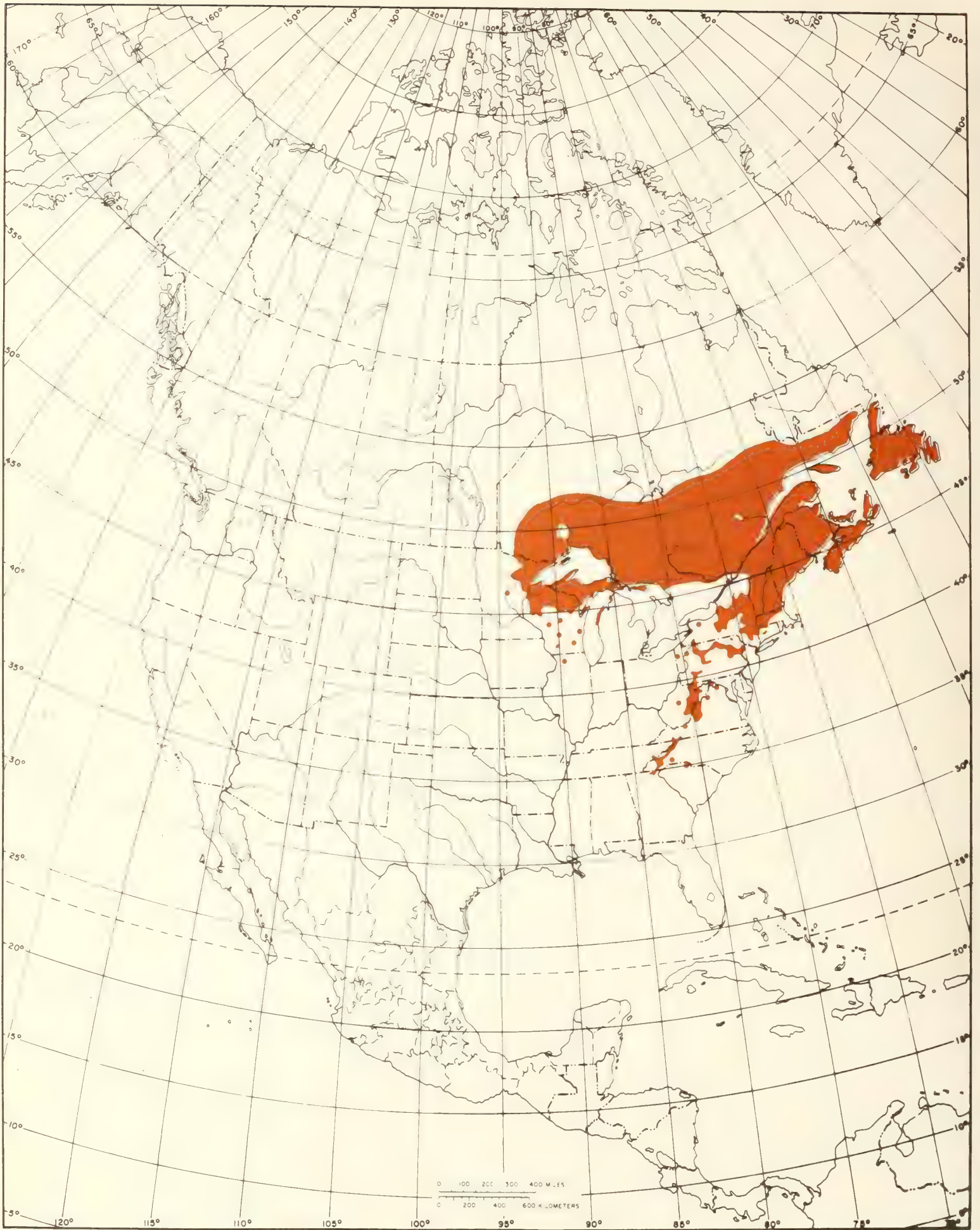
Map 139. *Sapindus saponaria* L., wingleaf soapberry. Also from Mex. s. to Brazil and Argentina. Through West Indies including Bahamas, P. R., and V. I. Also Hawaii and other Pacific Is.



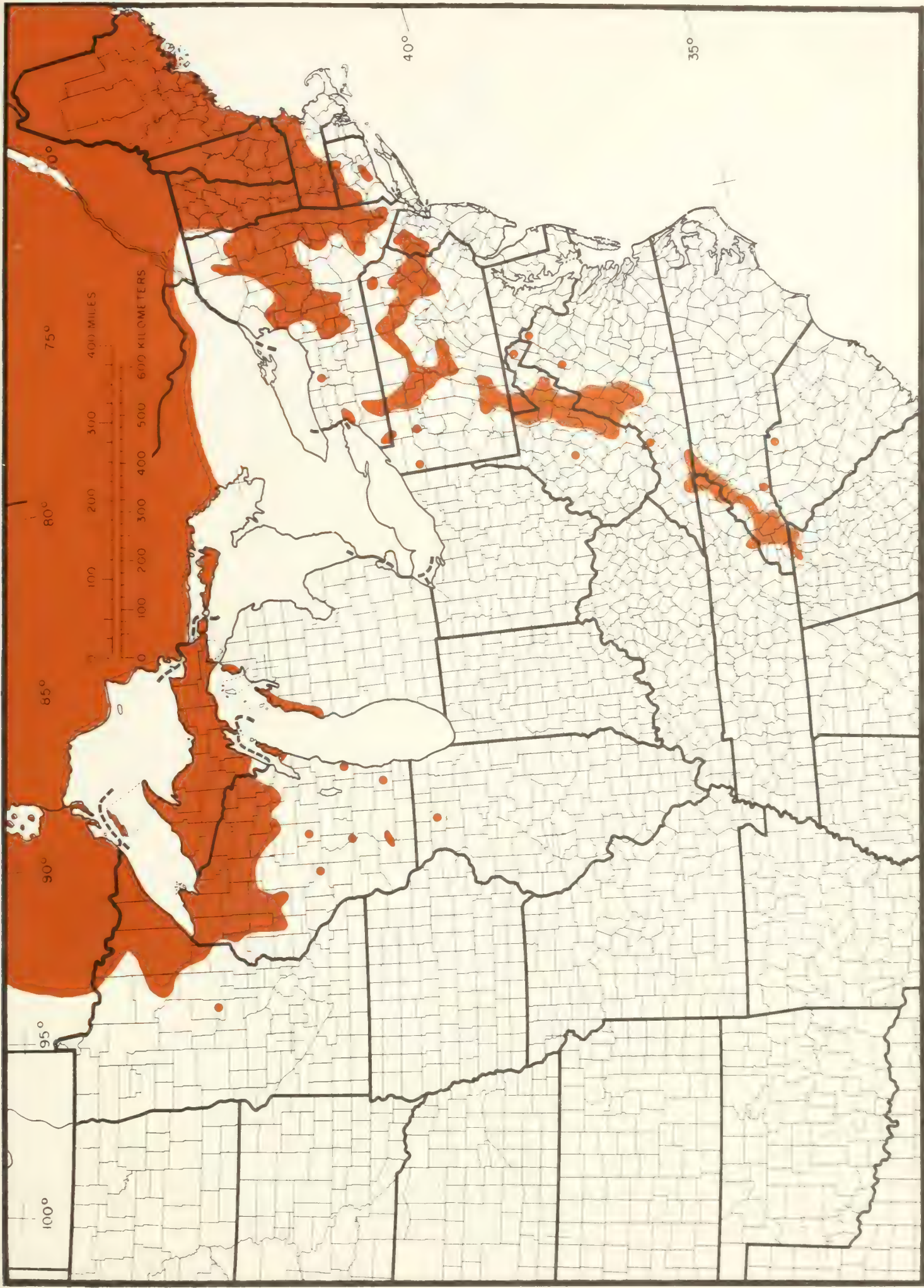
Map 140-N. *Solanum erianthum* D. Don, mullein nightshade. Also from n. Mex. (Son. to Tamps. s. to Chis.) s. through C. Am. and n. S. Am. to Peru.



Map 140-SE. *Solanum erianthum* D. Don, mullein nightshade.



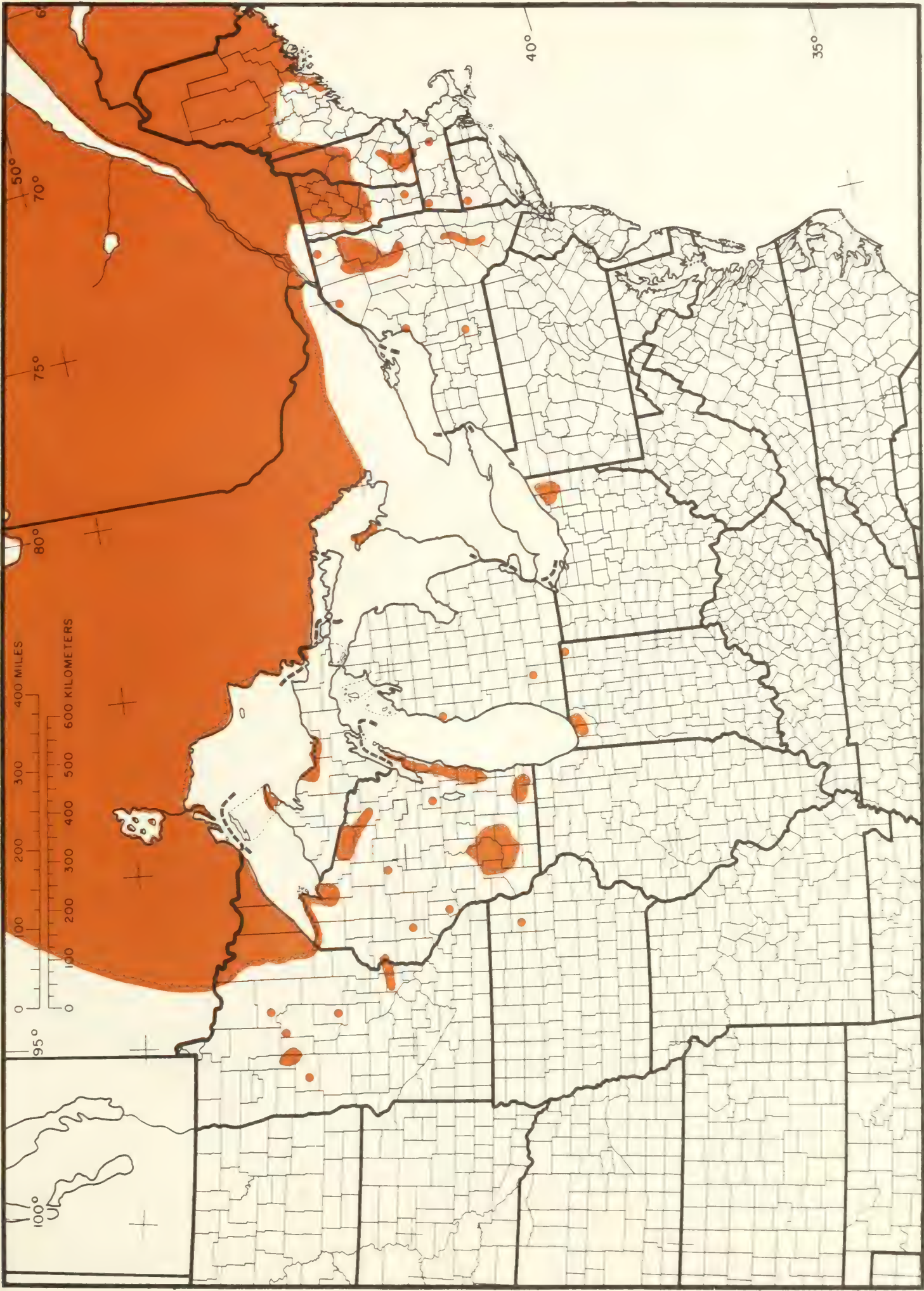
Map 141-N. *Sorbus americana* Marsh., American mountain-ash.



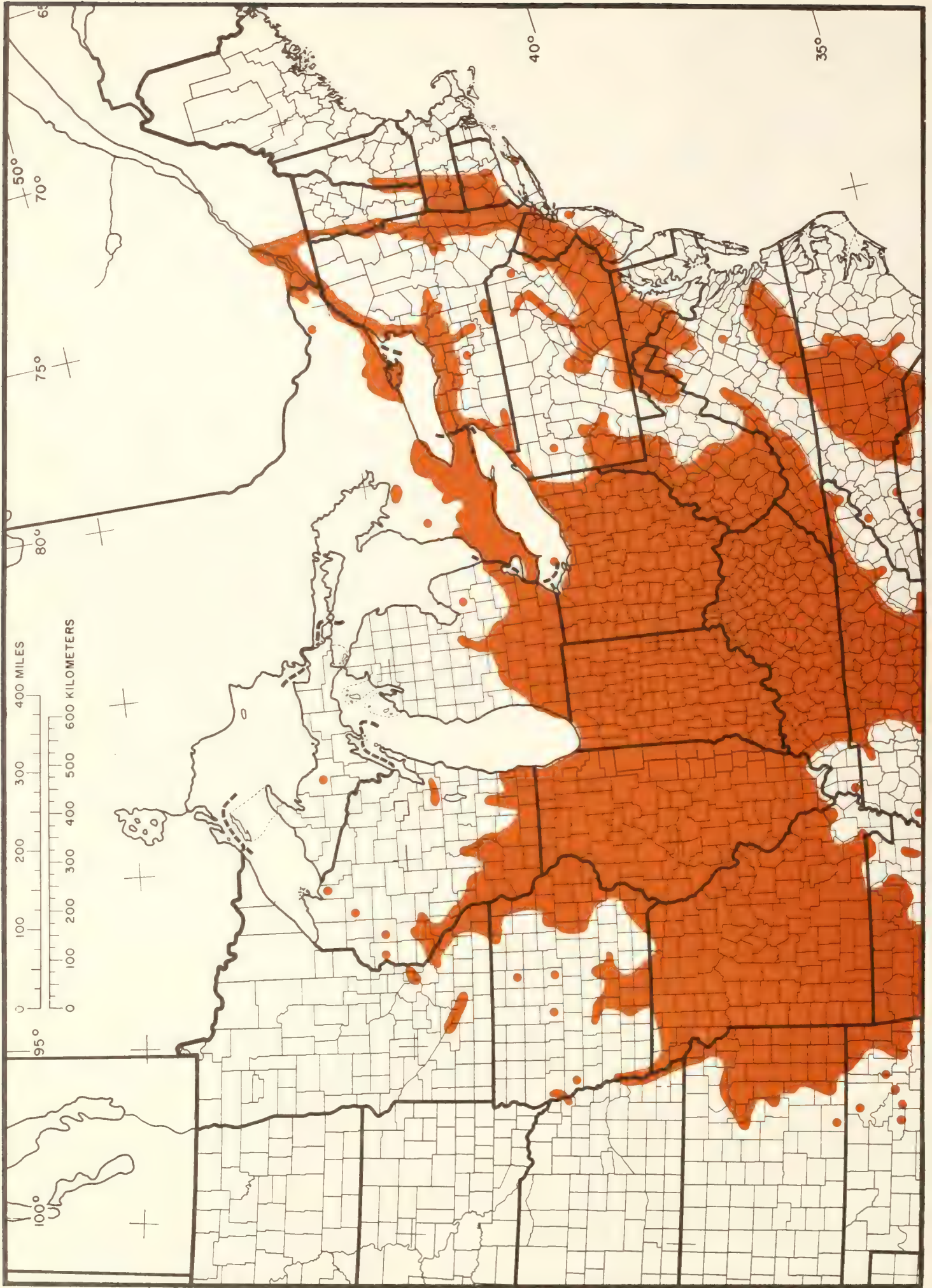
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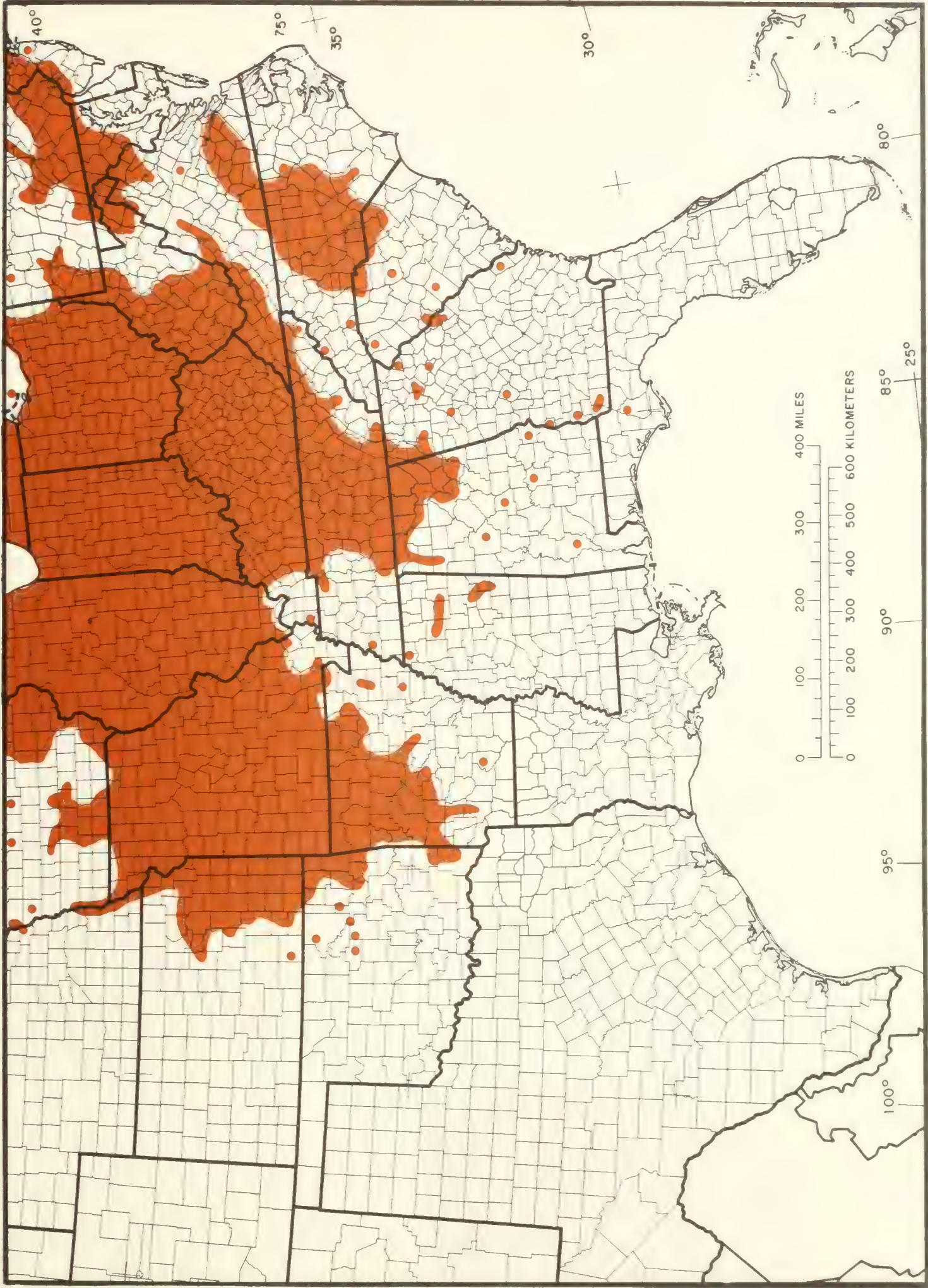
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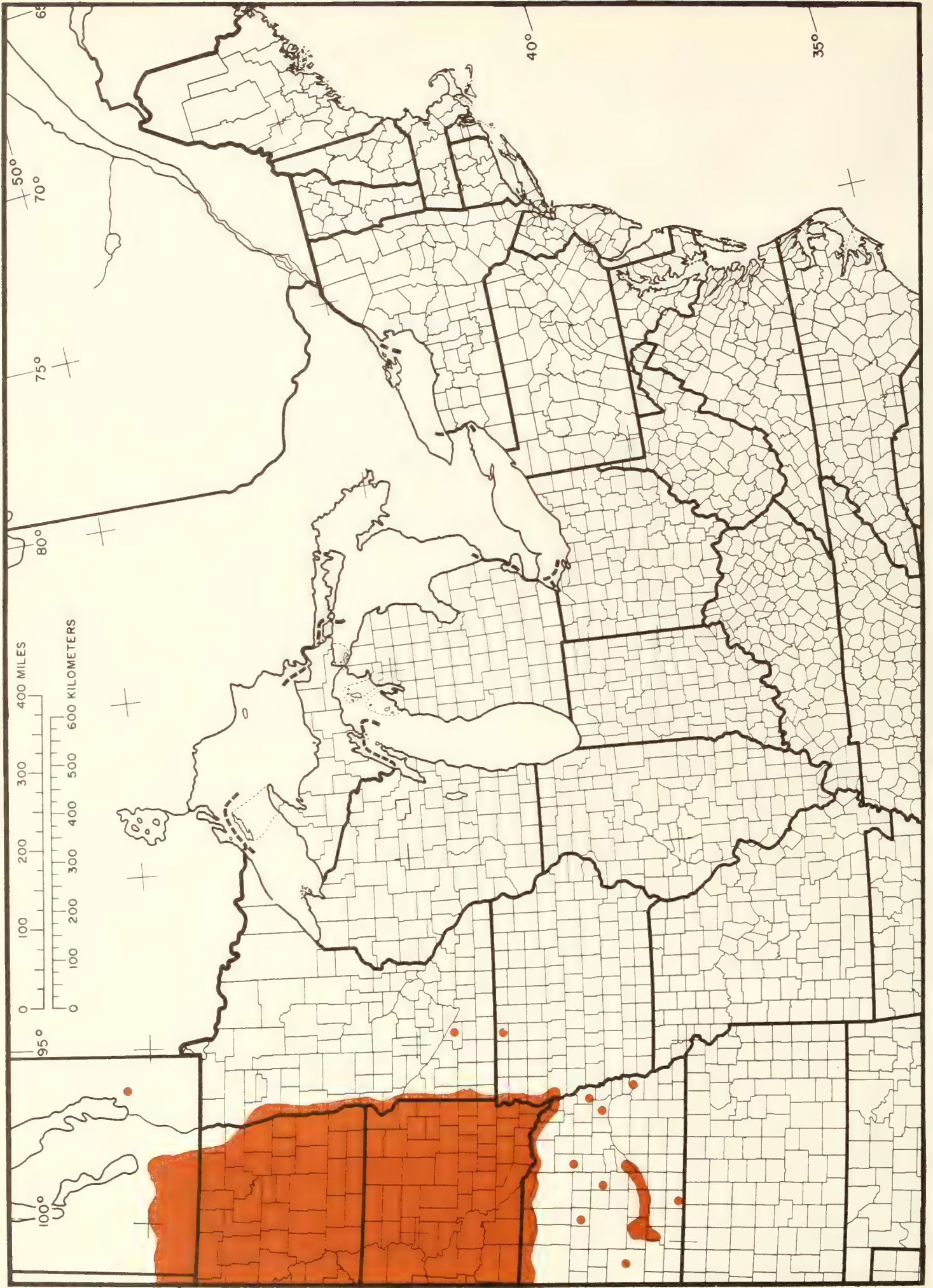
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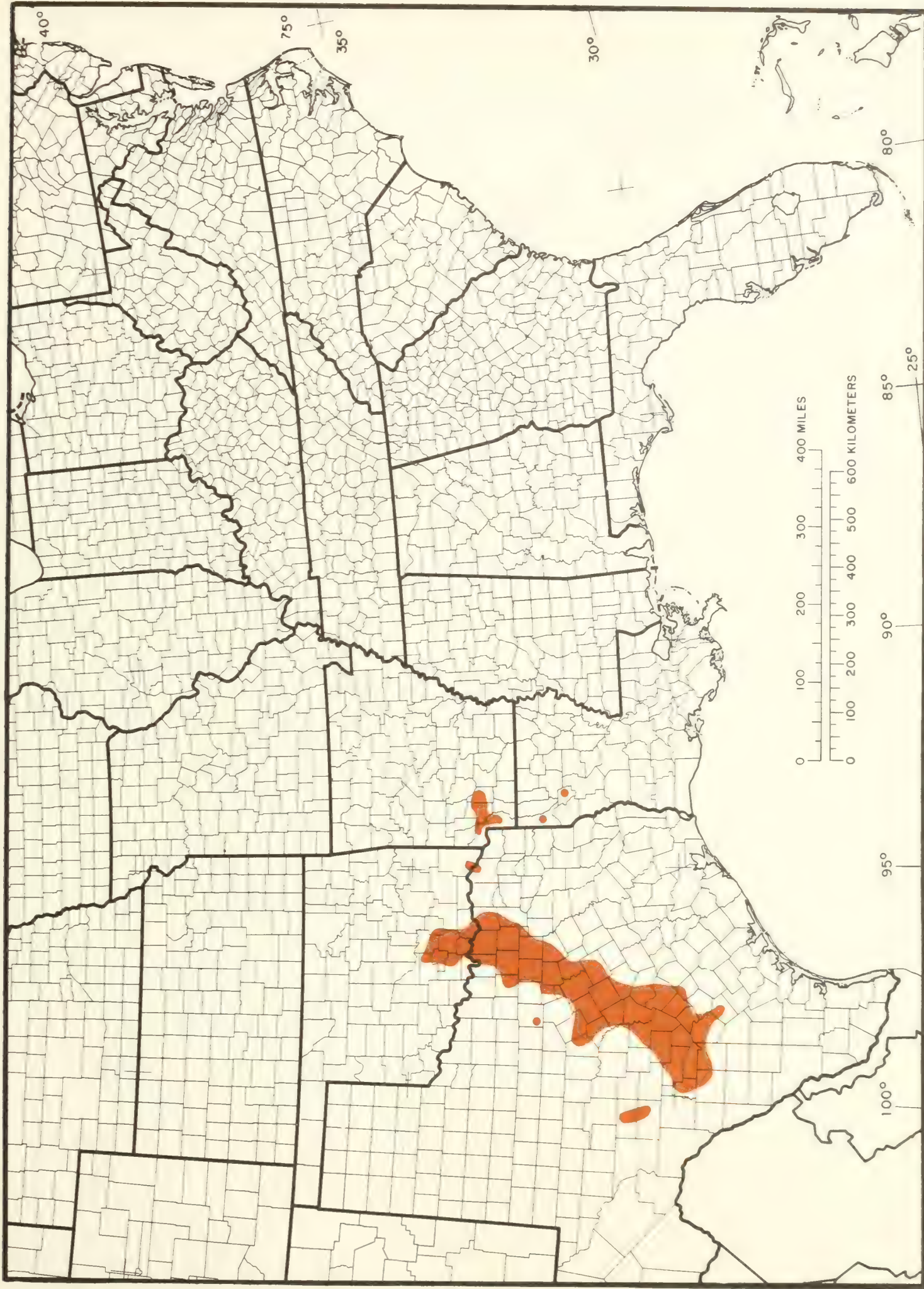
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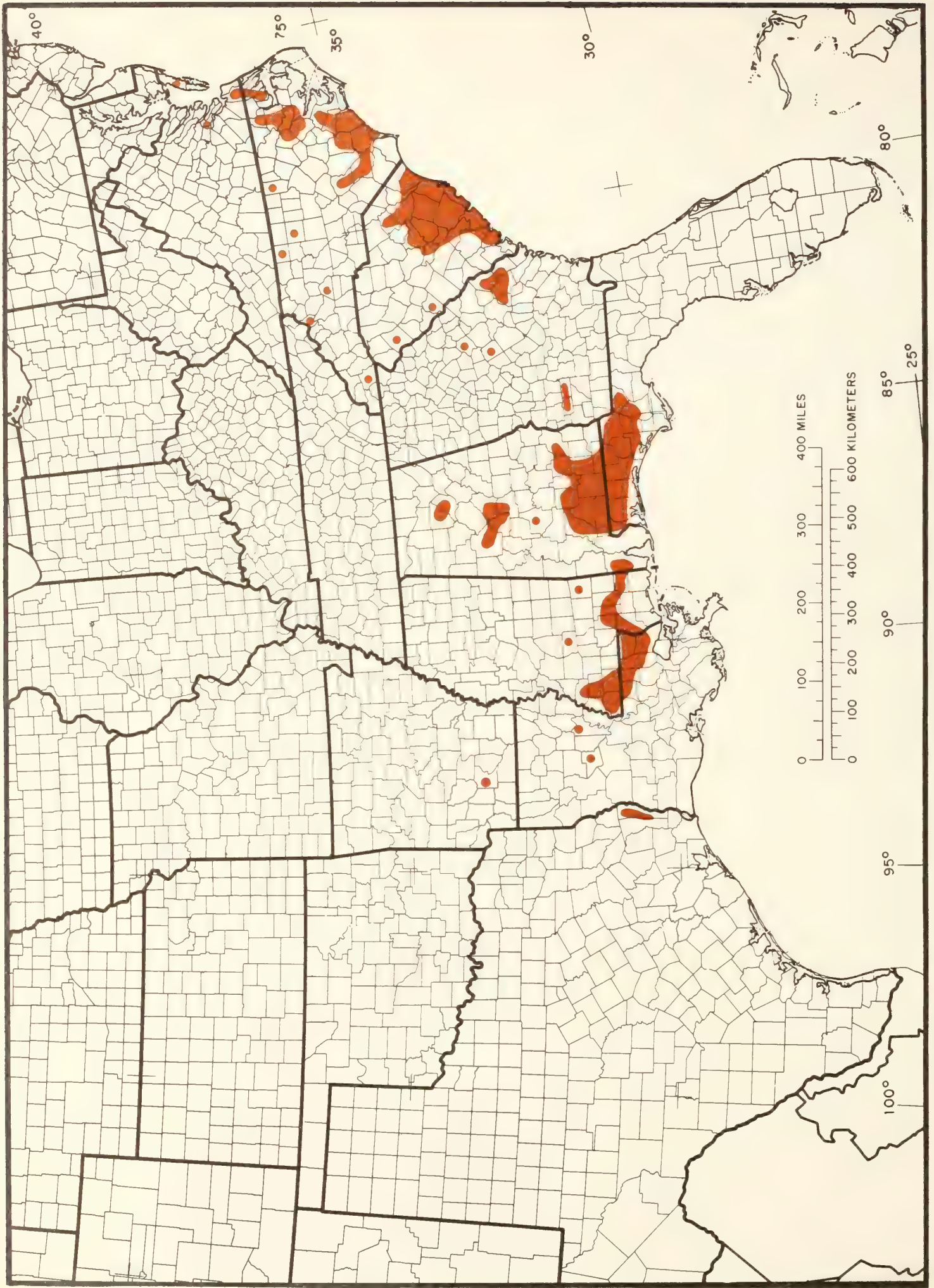
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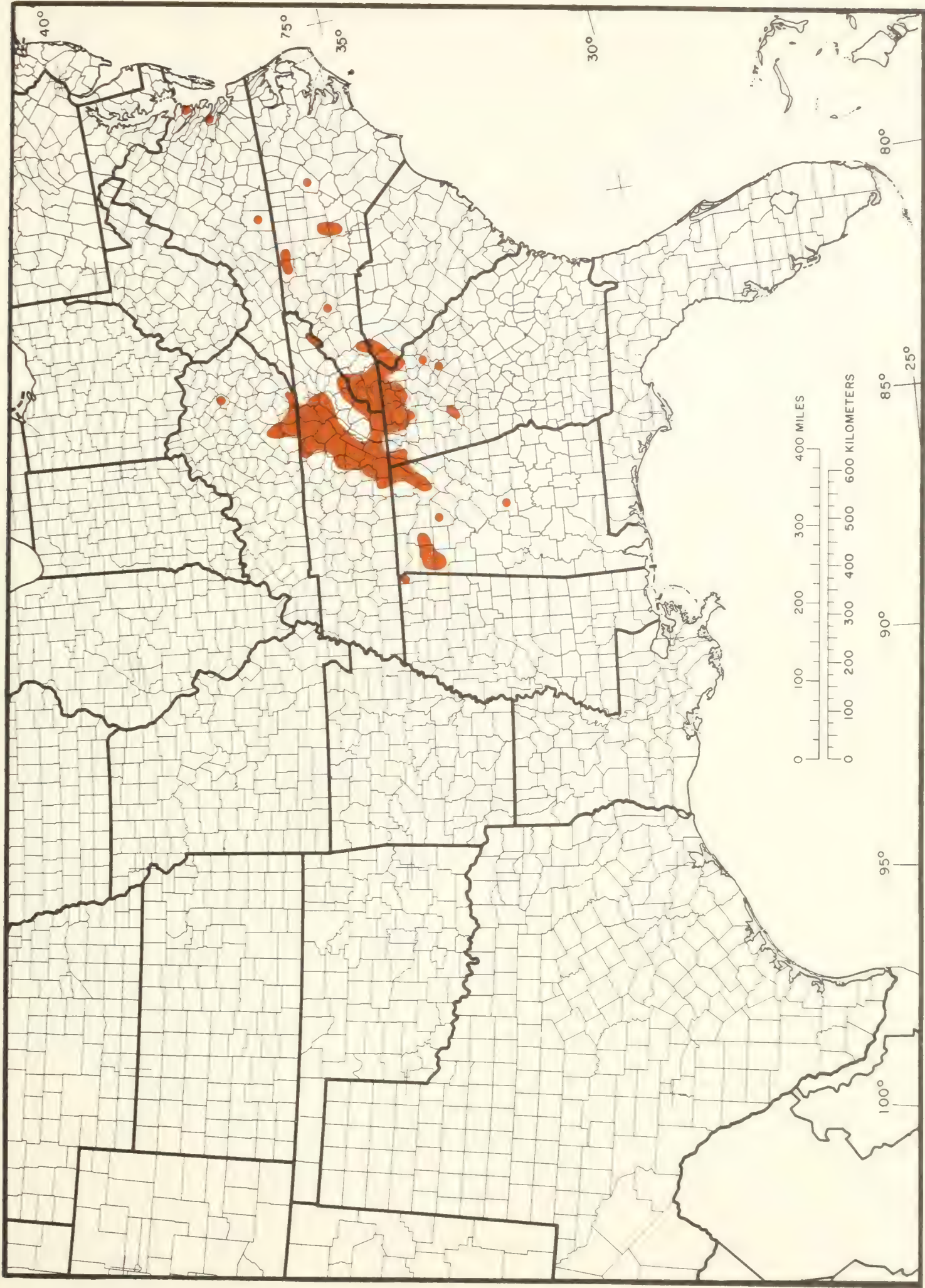
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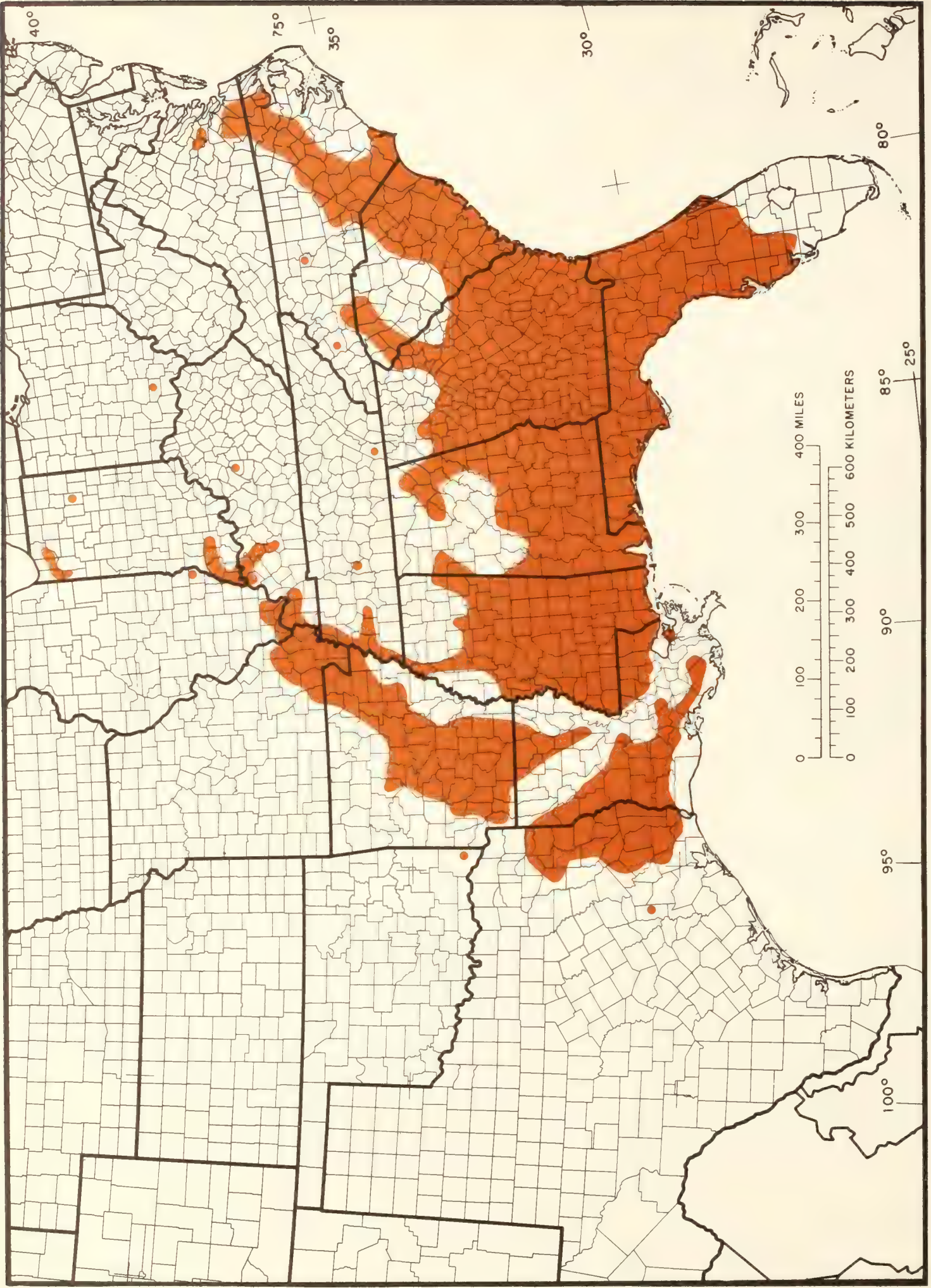
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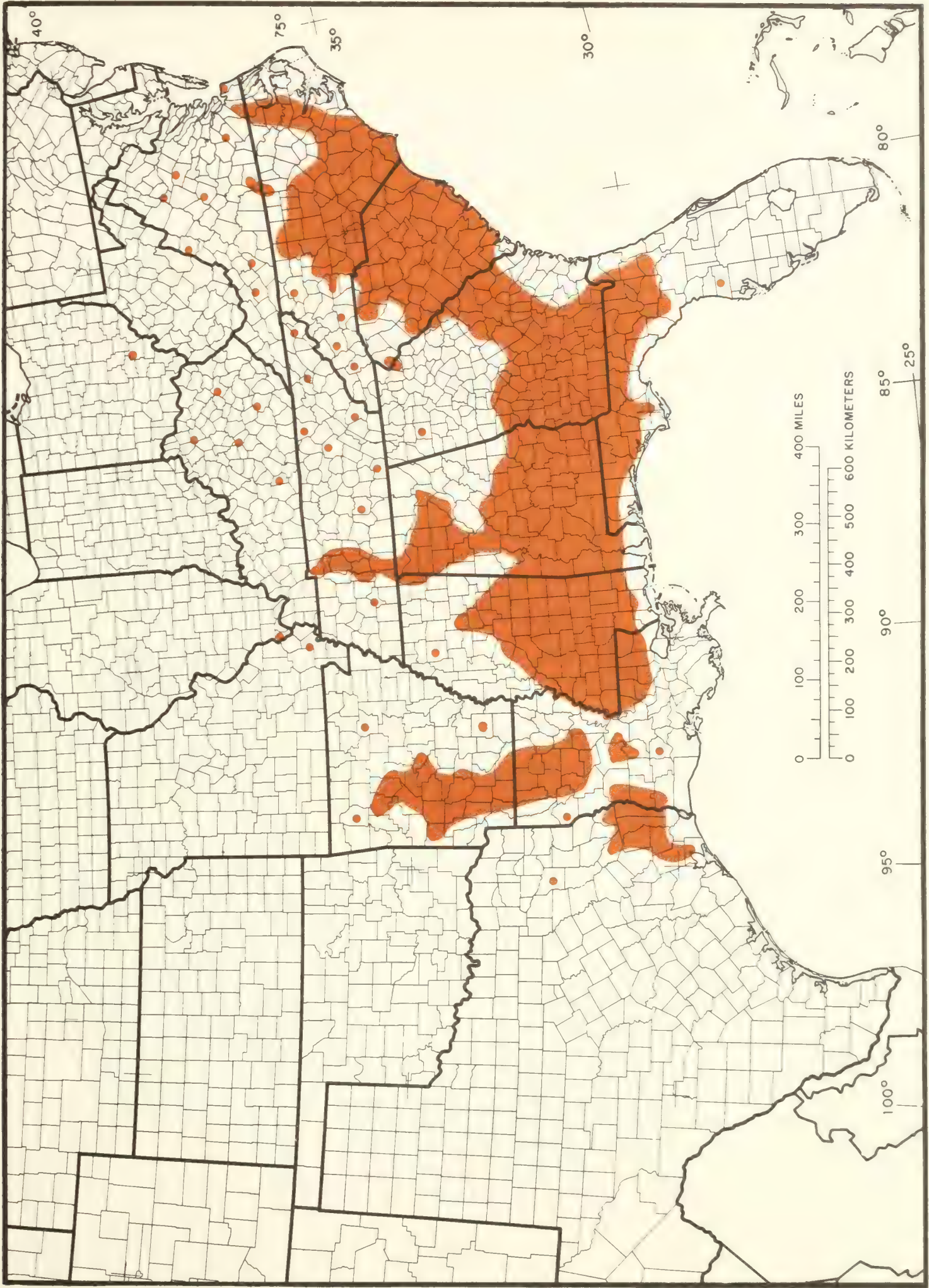
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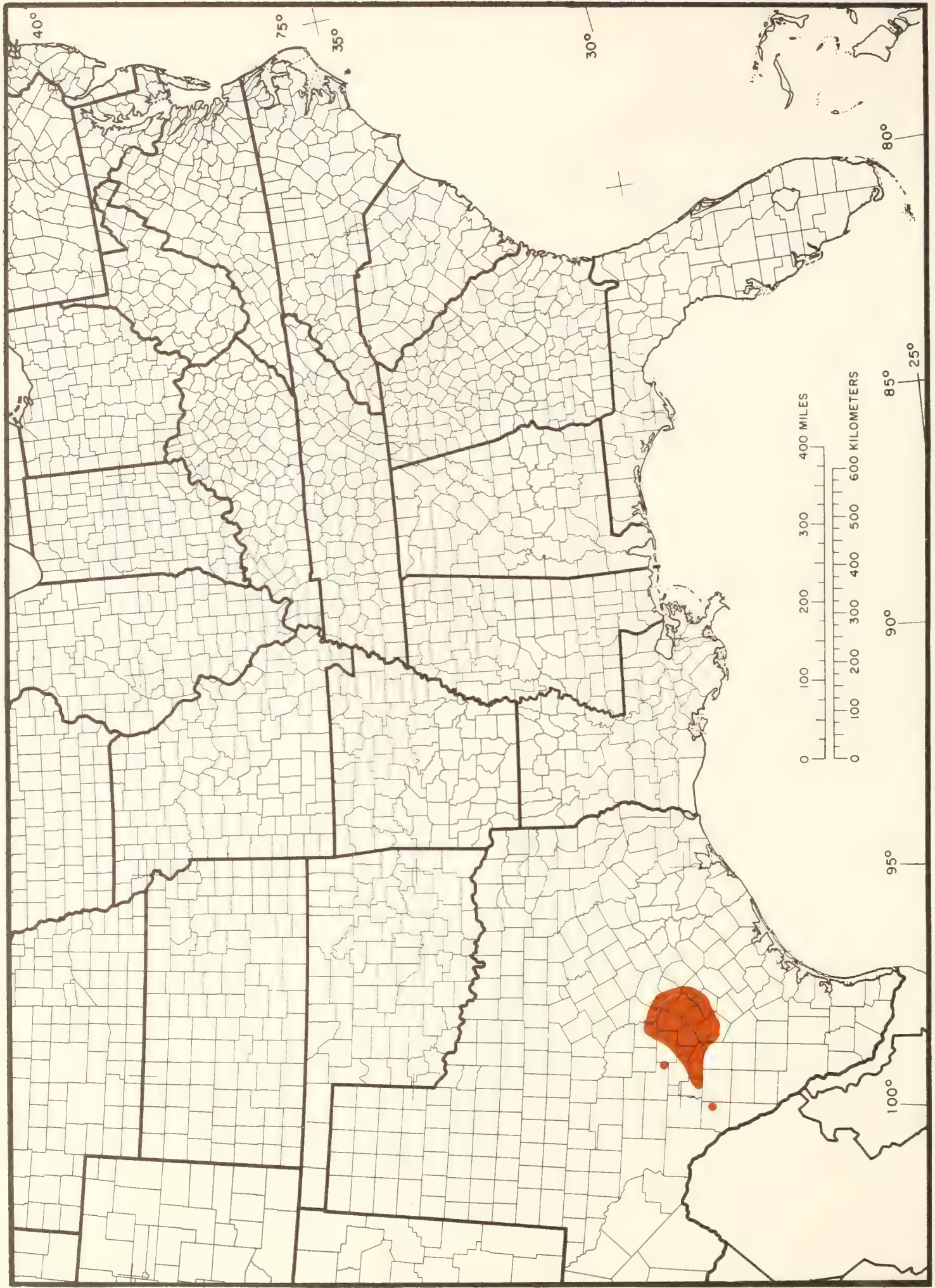
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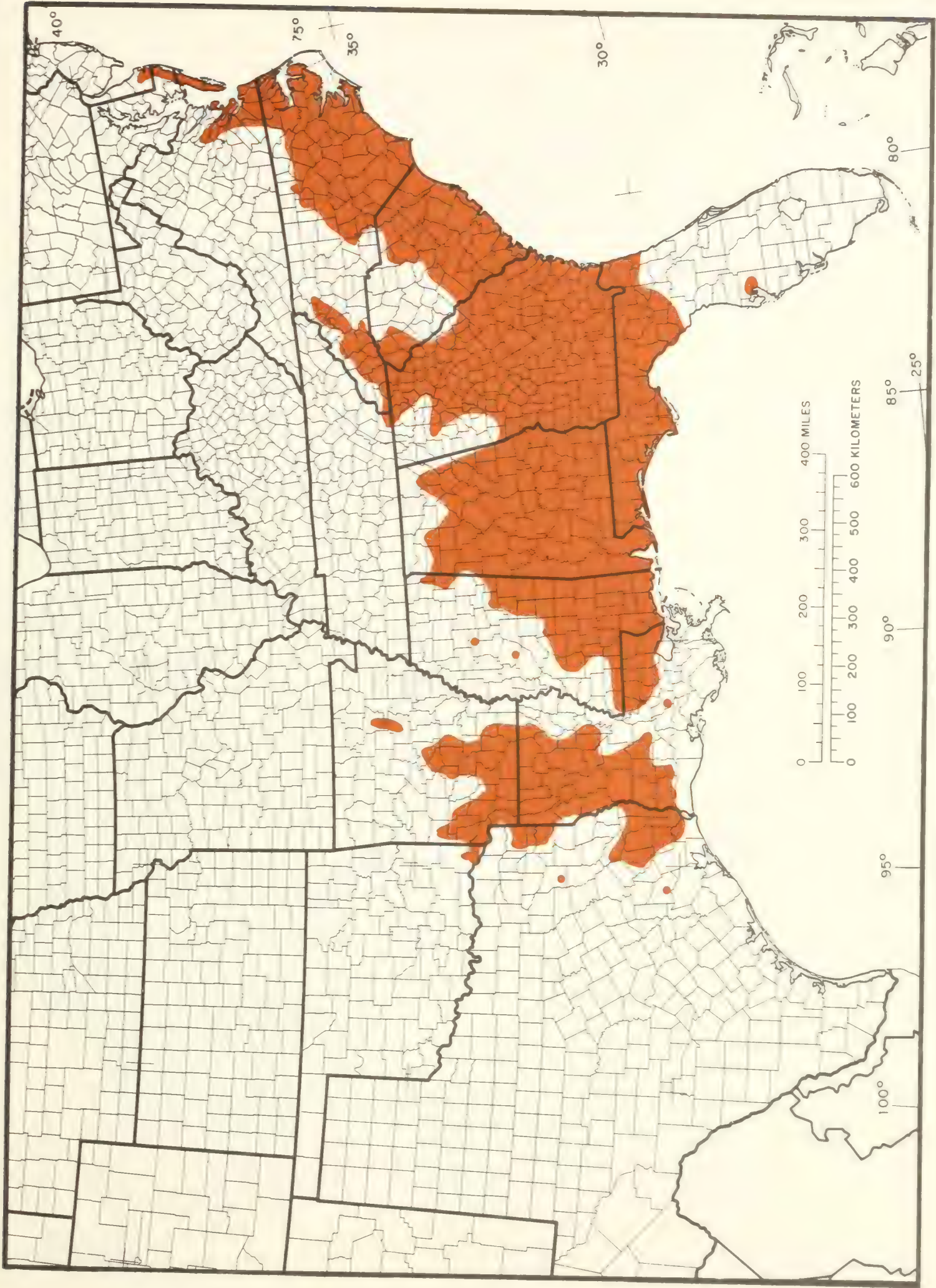
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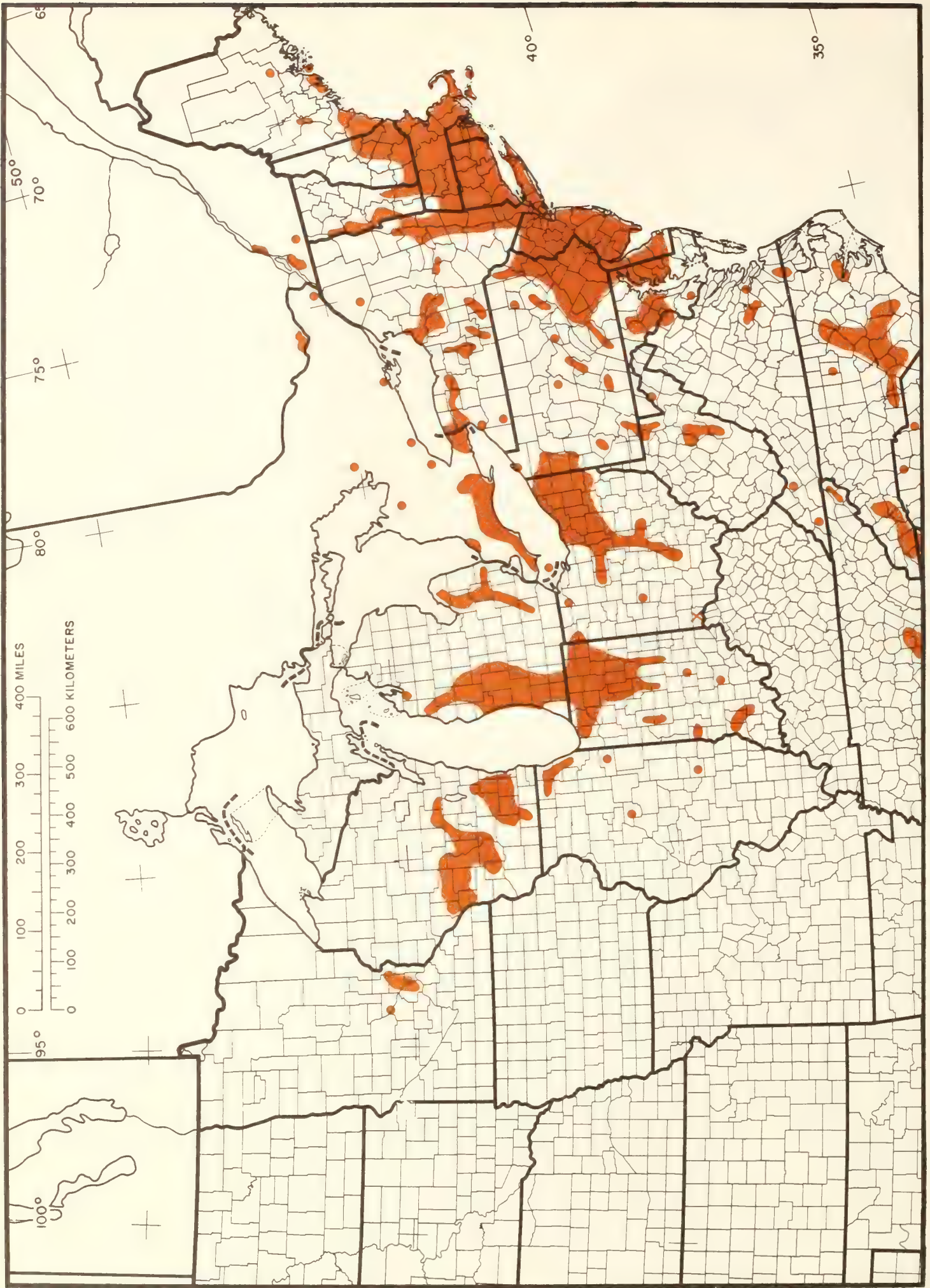
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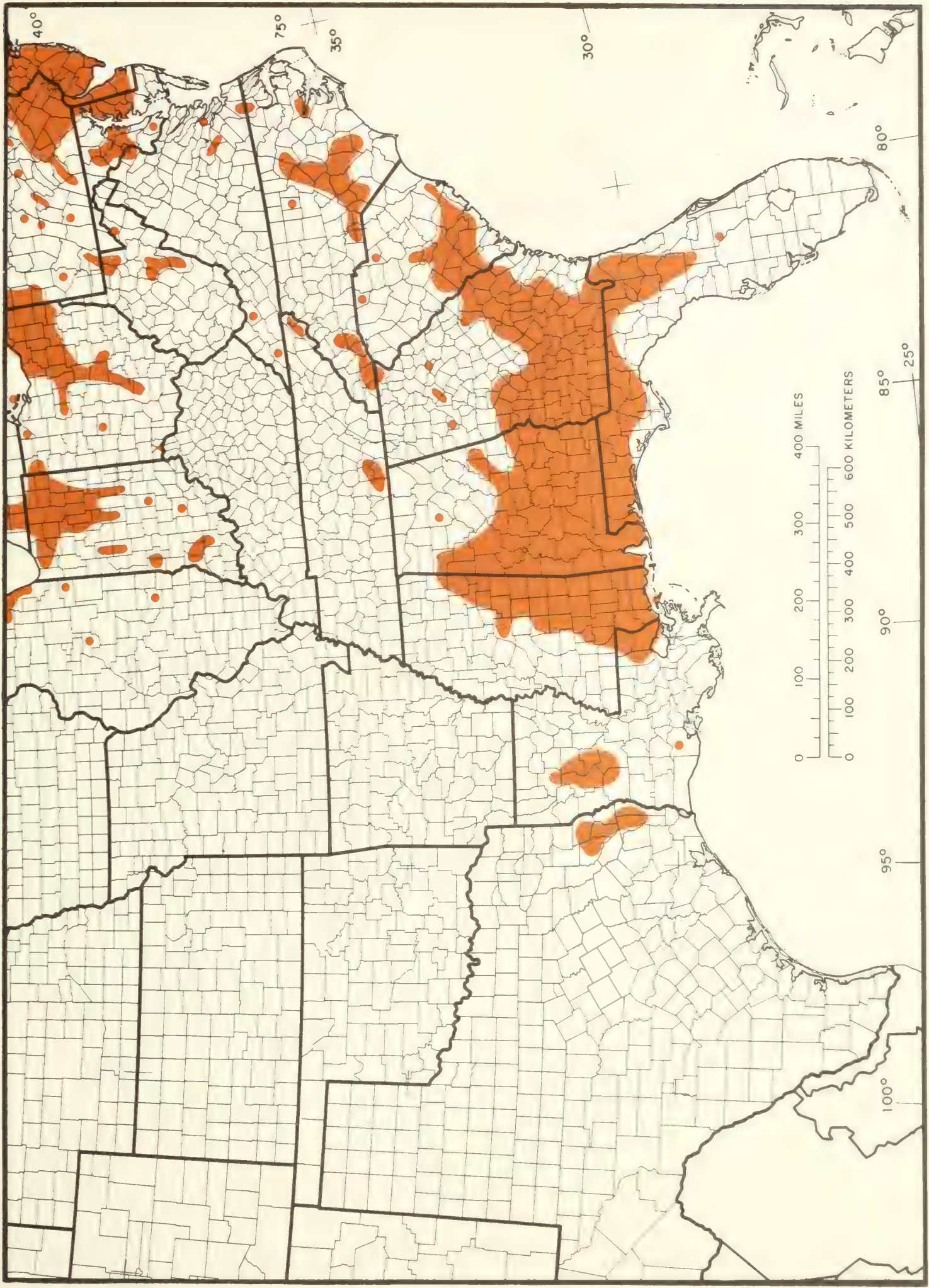
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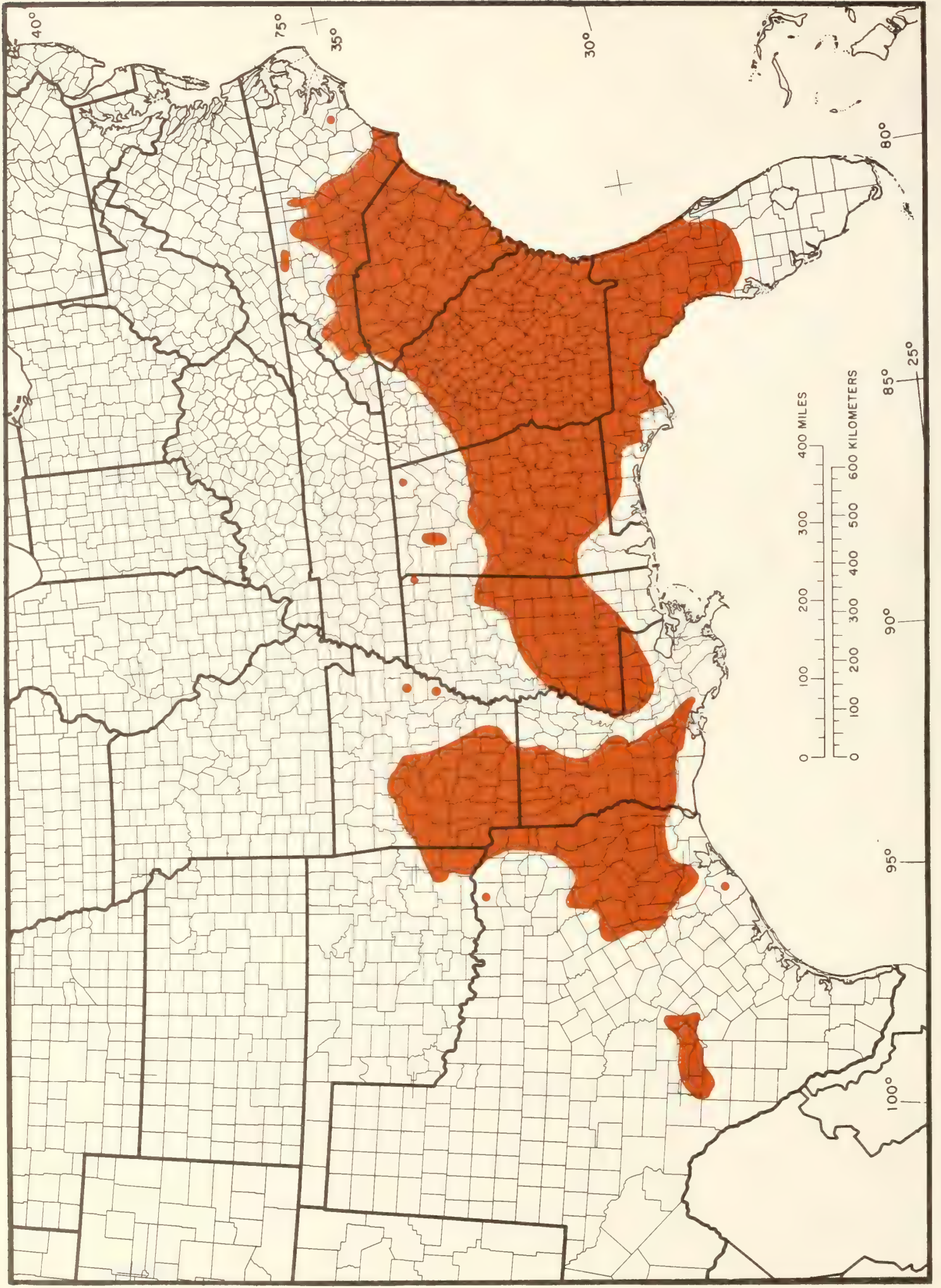
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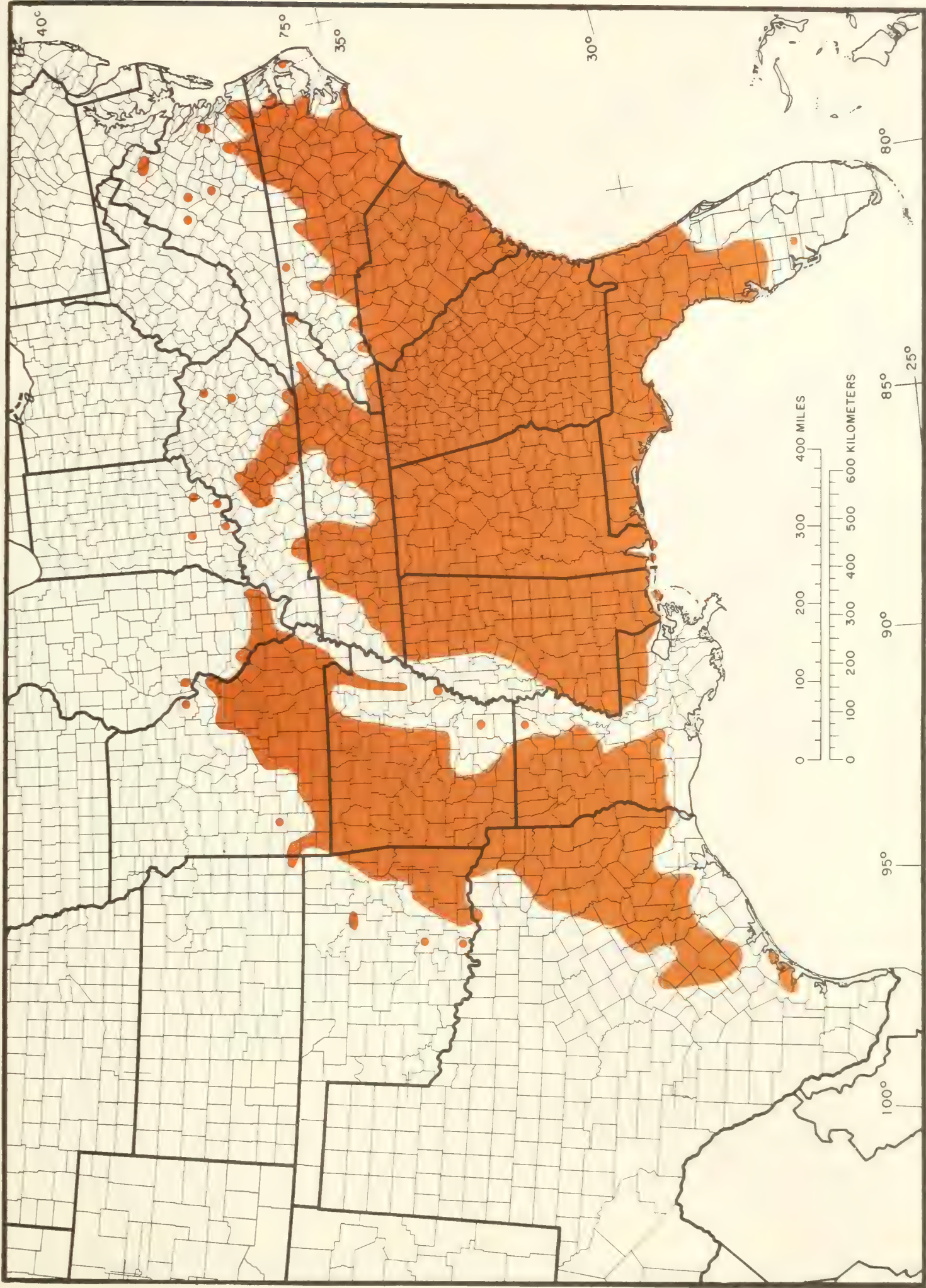
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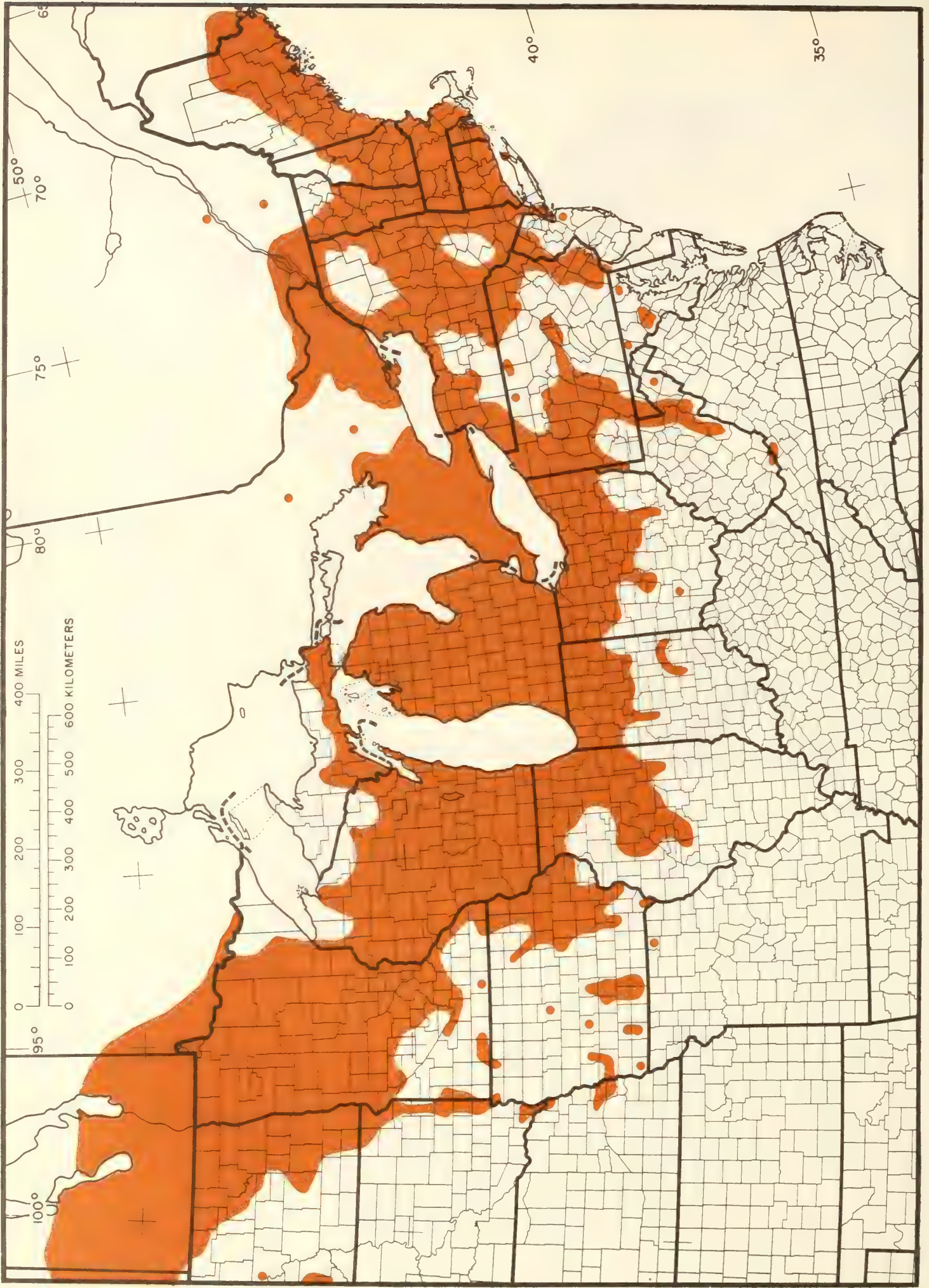
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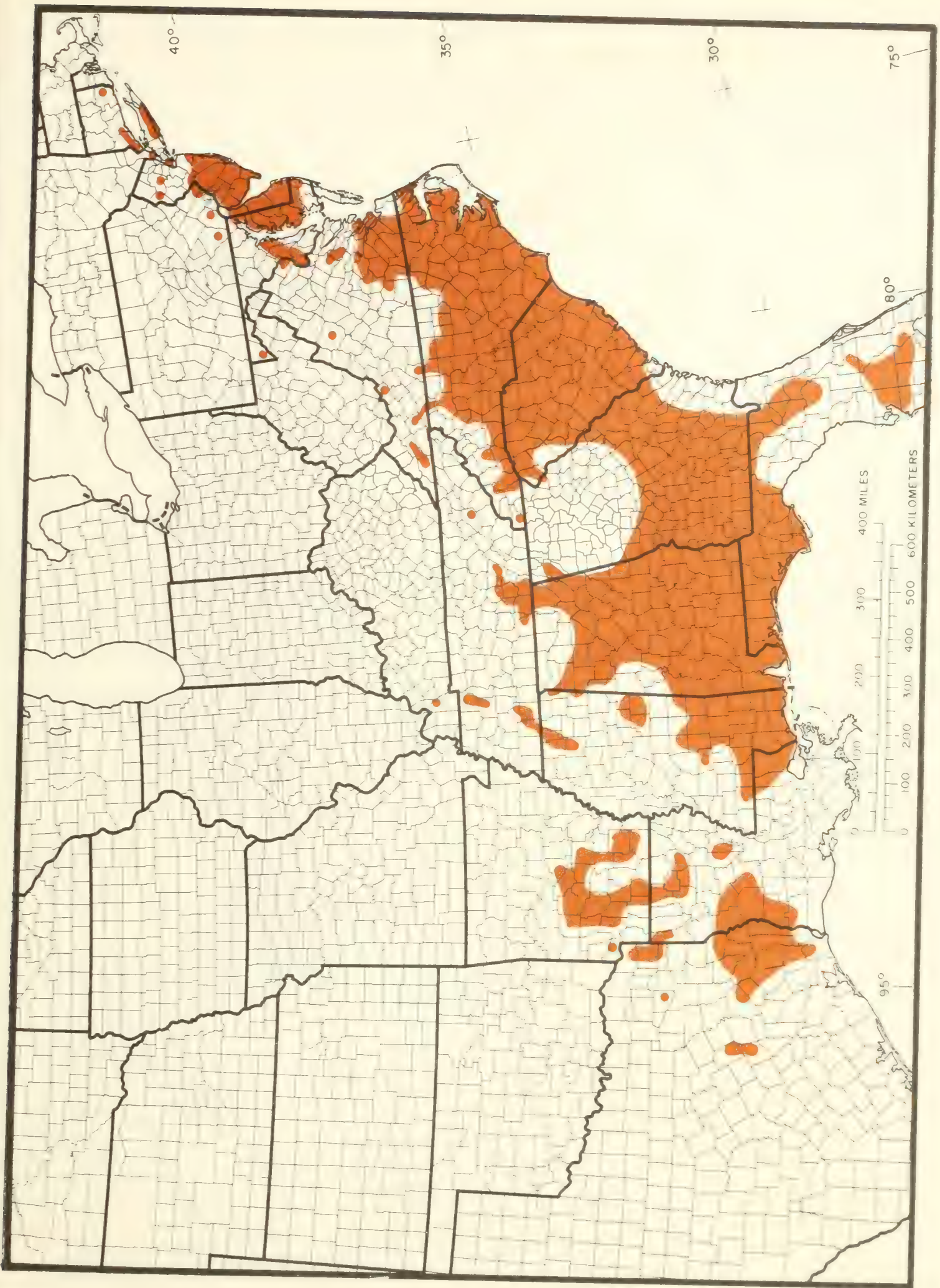
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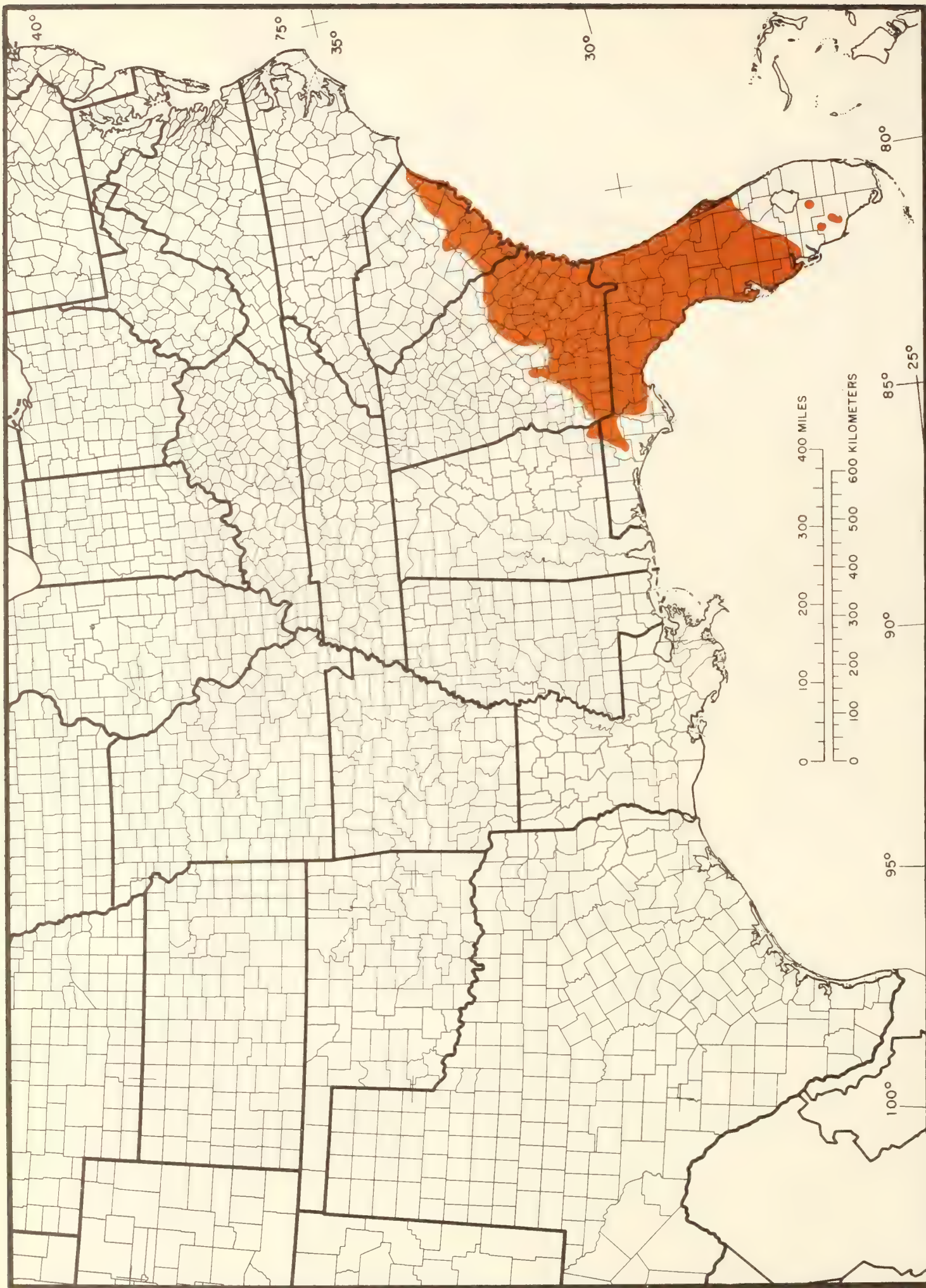
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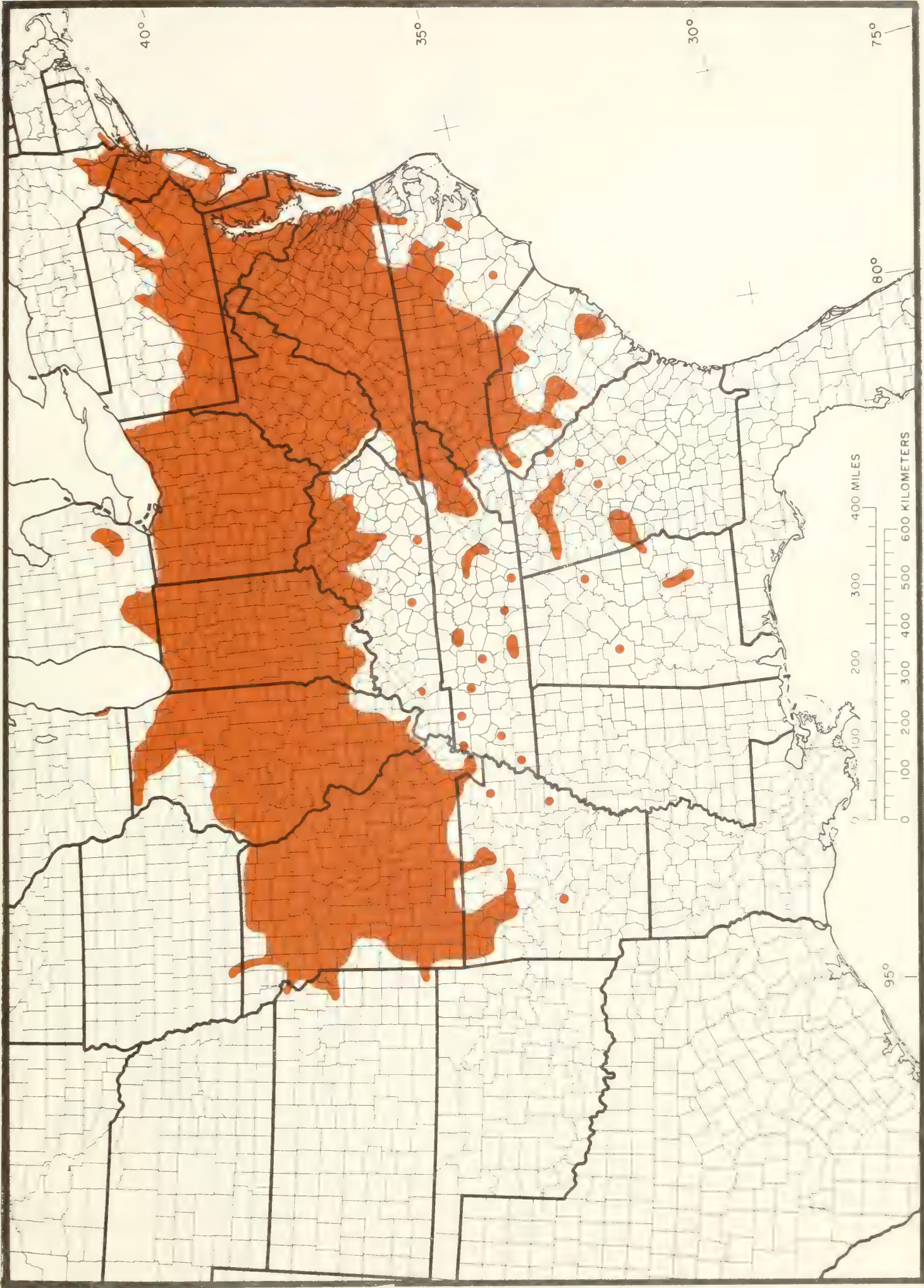
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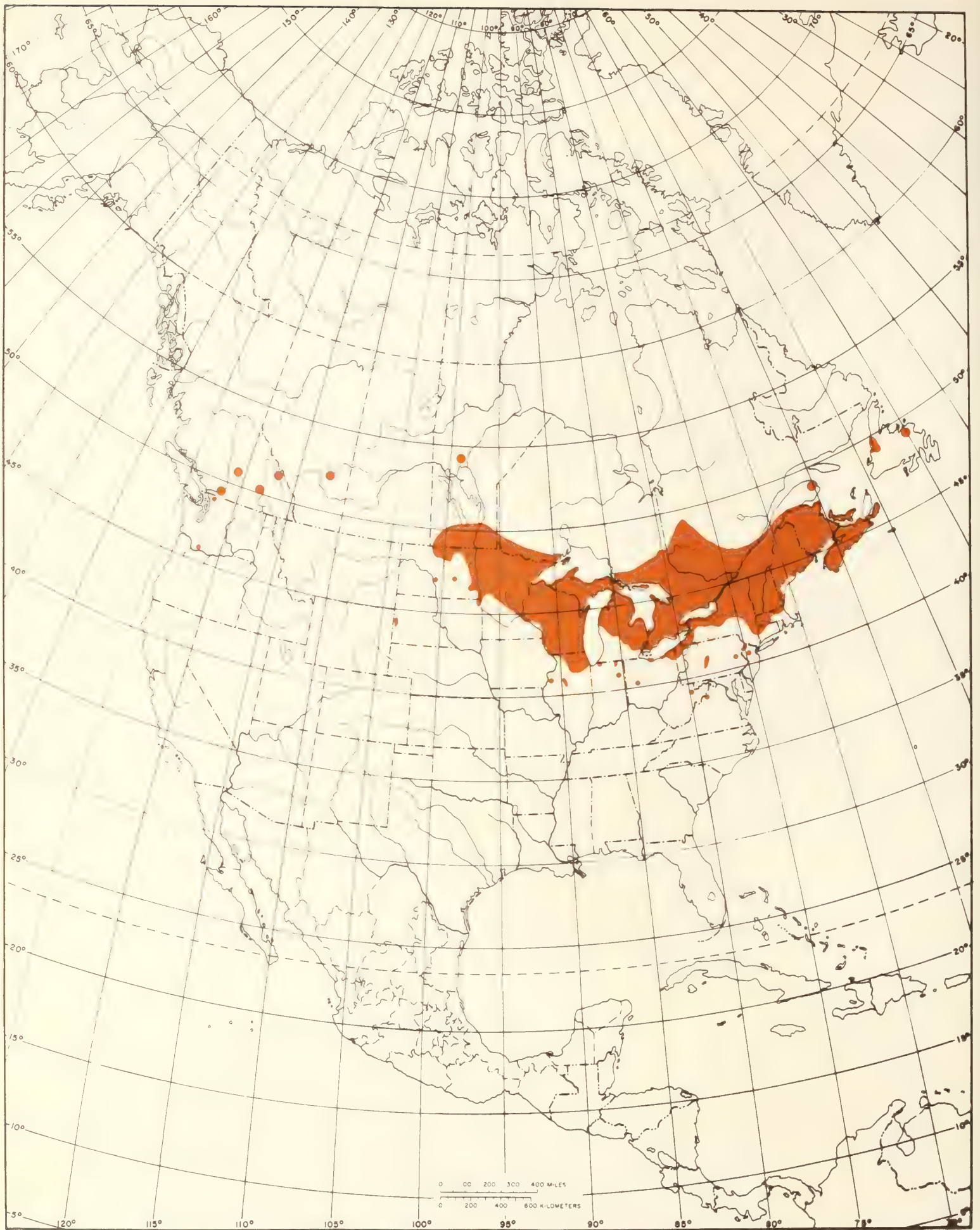
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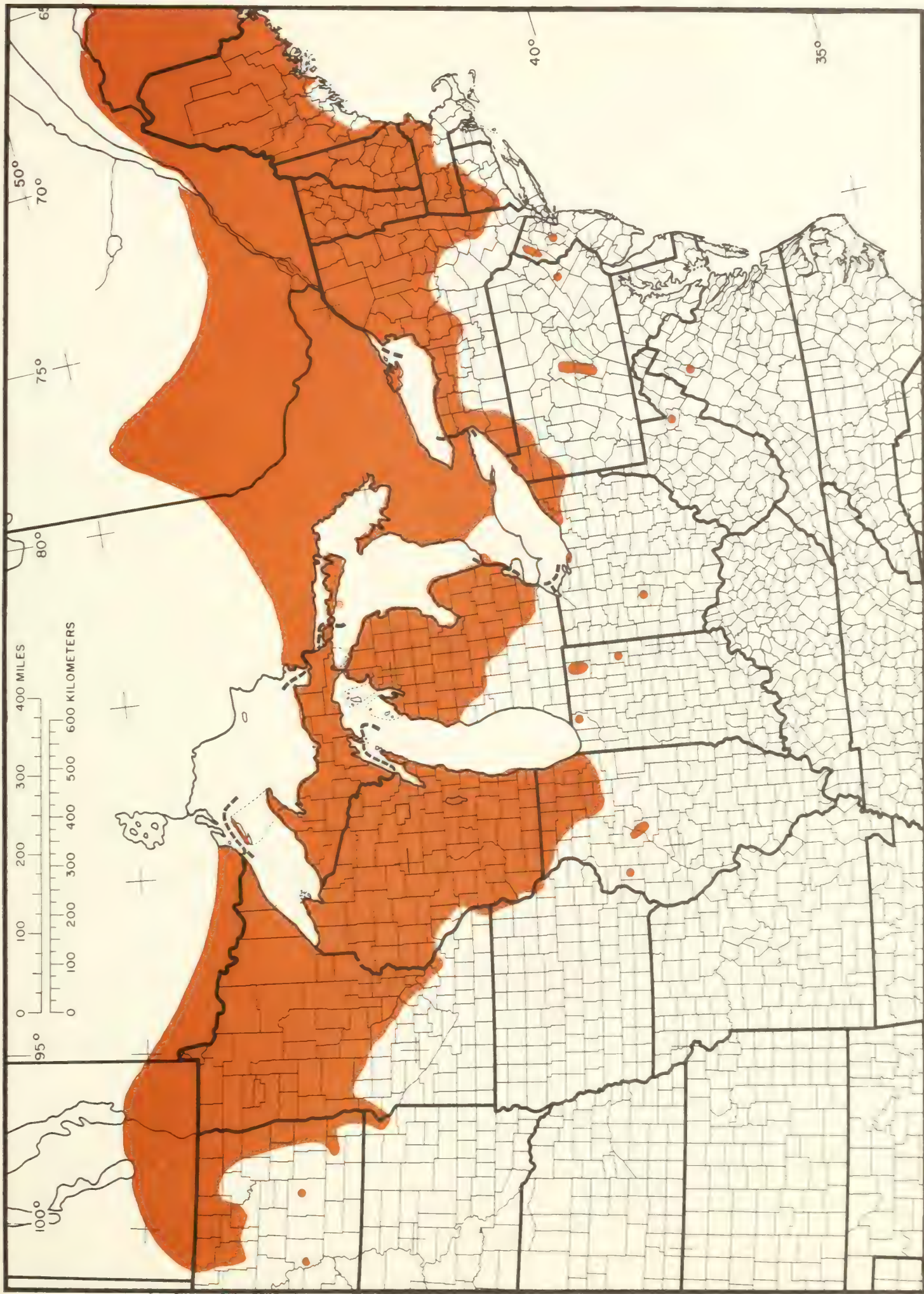
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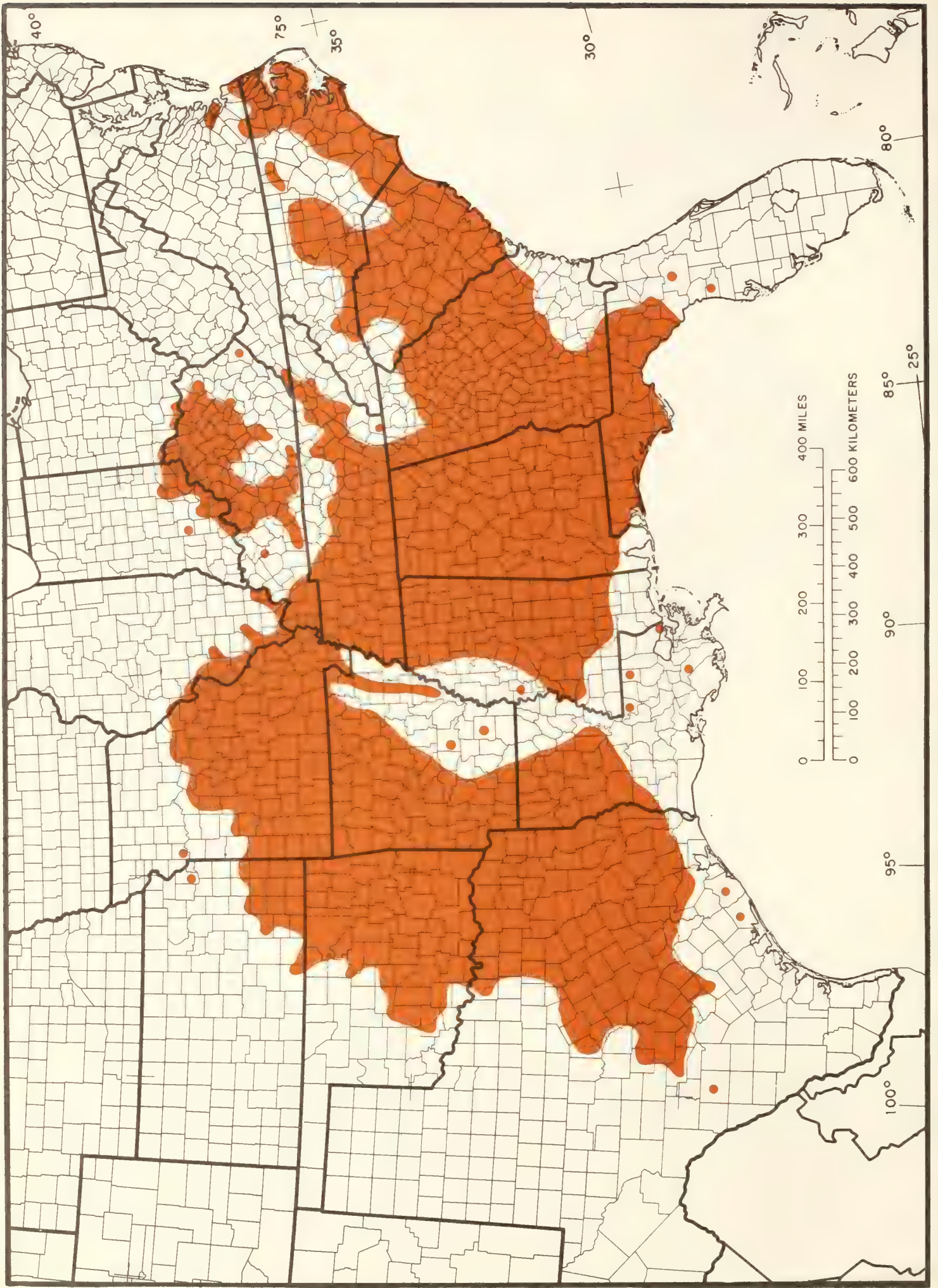
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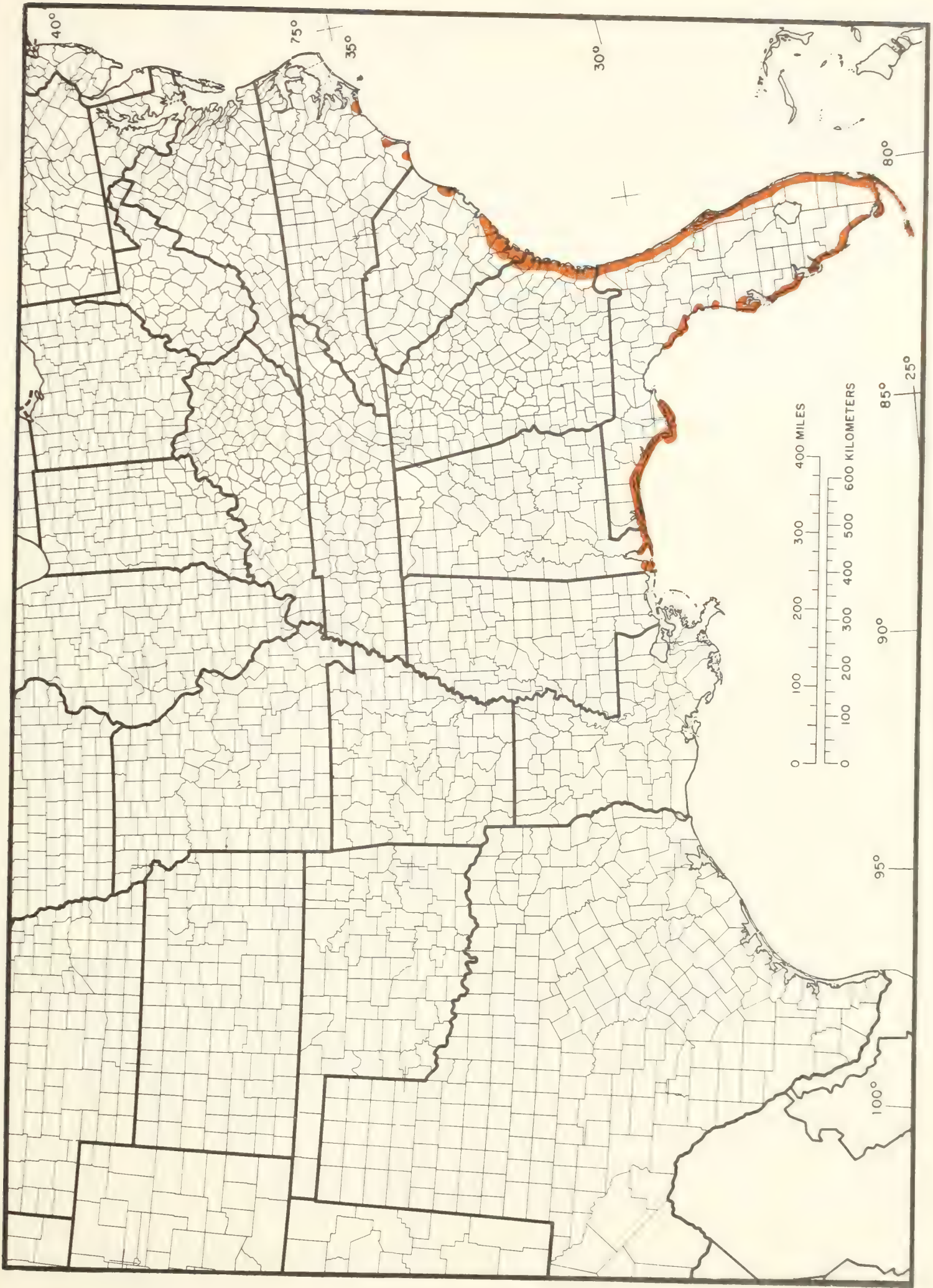
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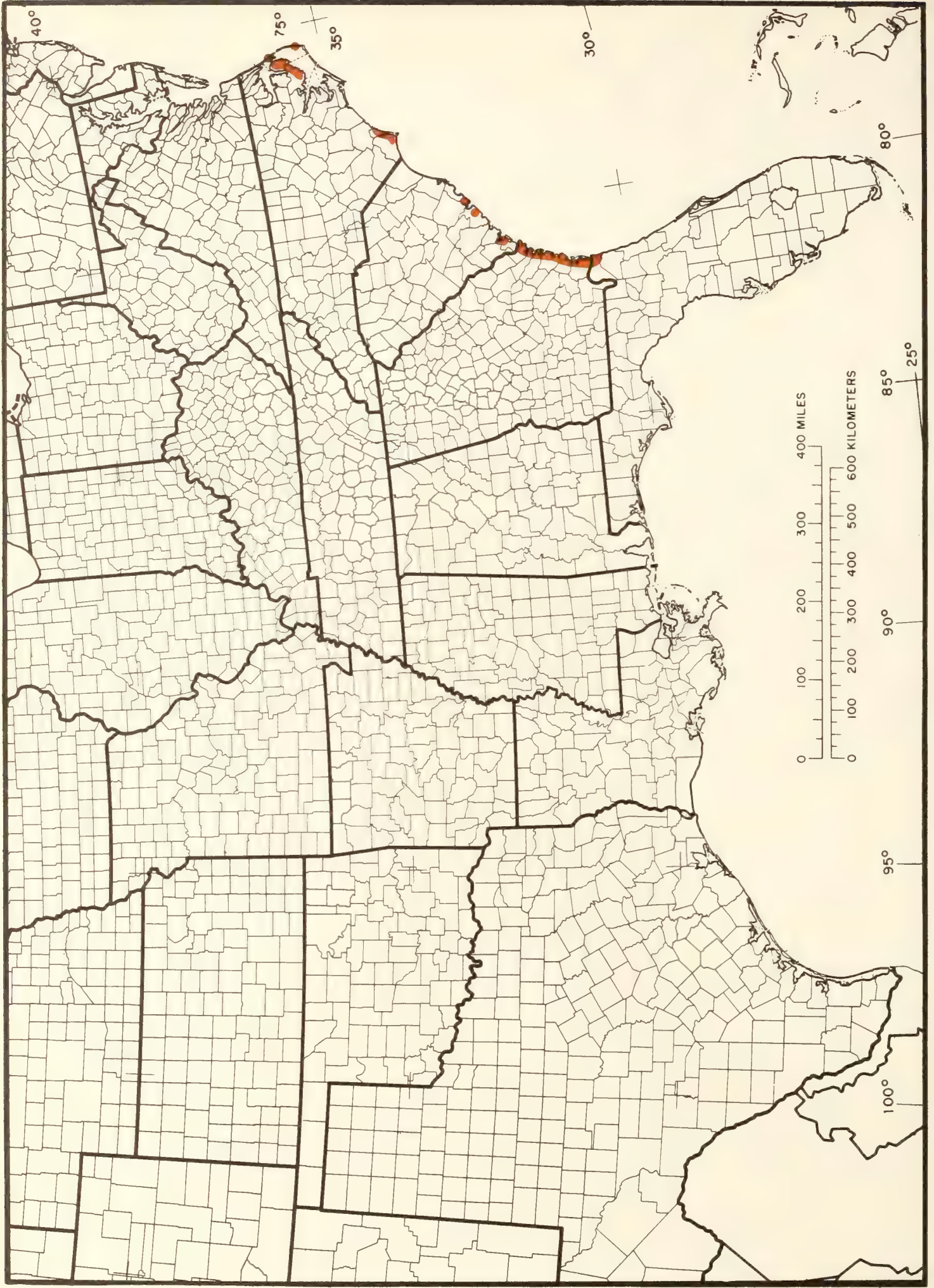
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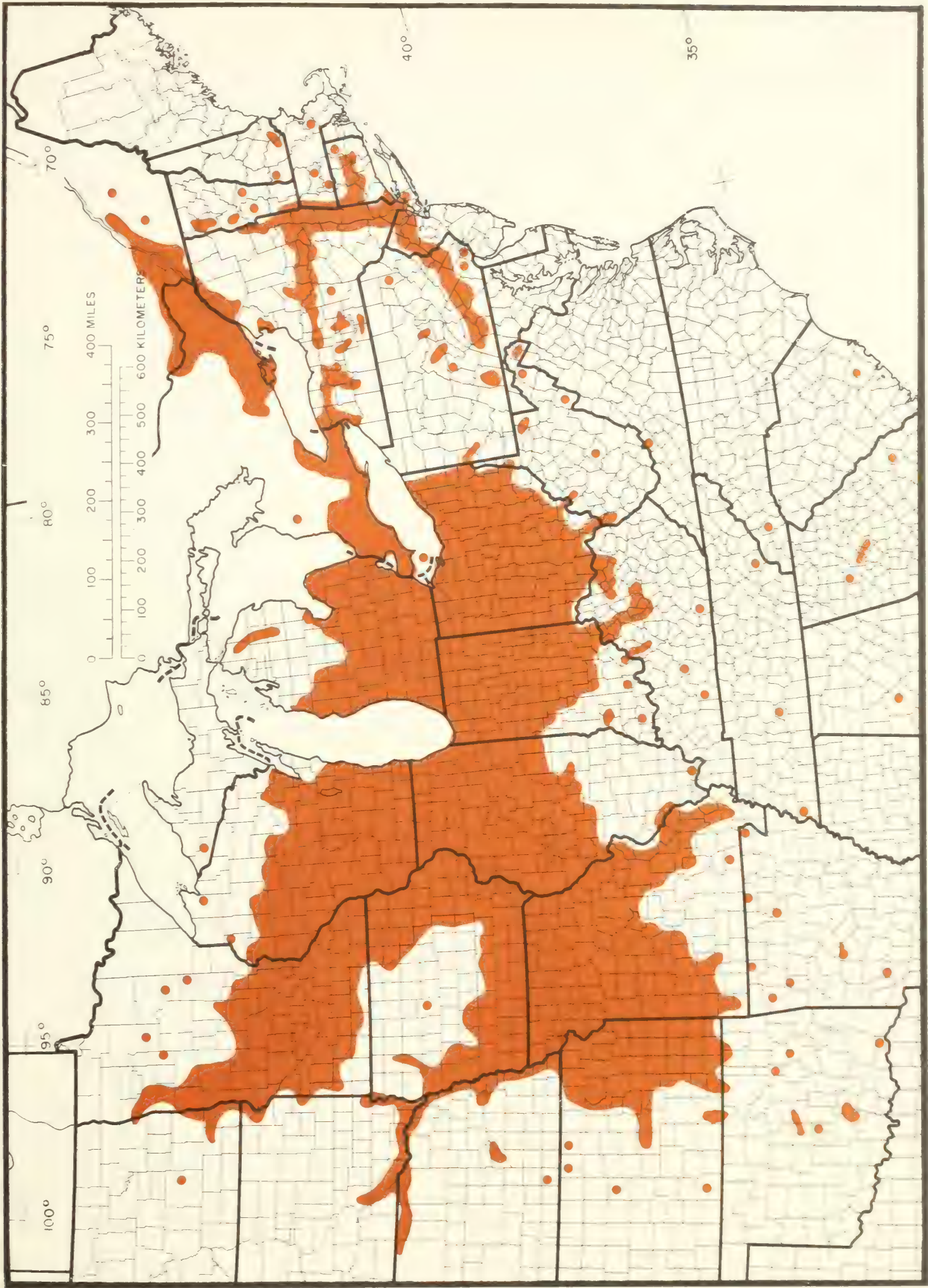
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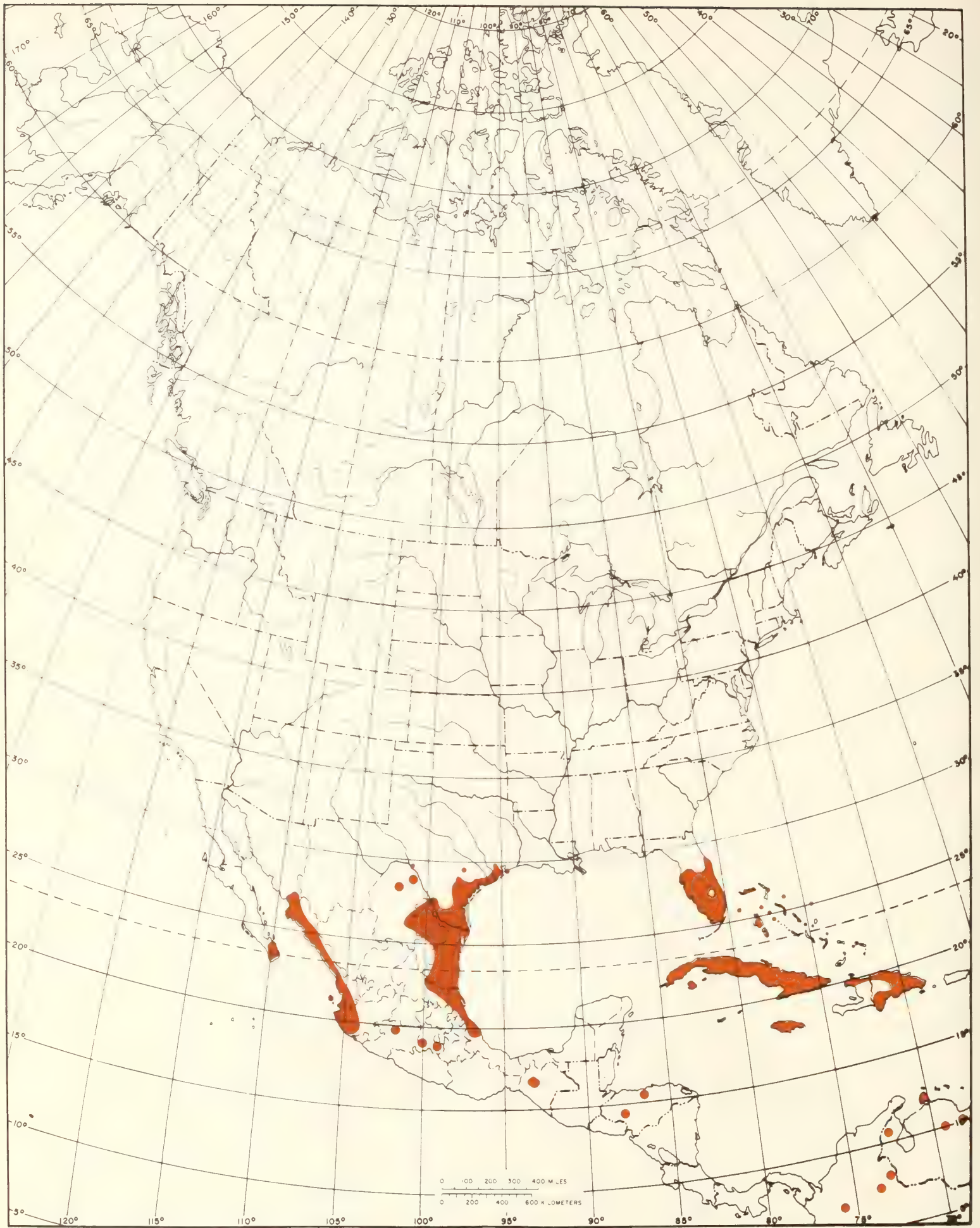
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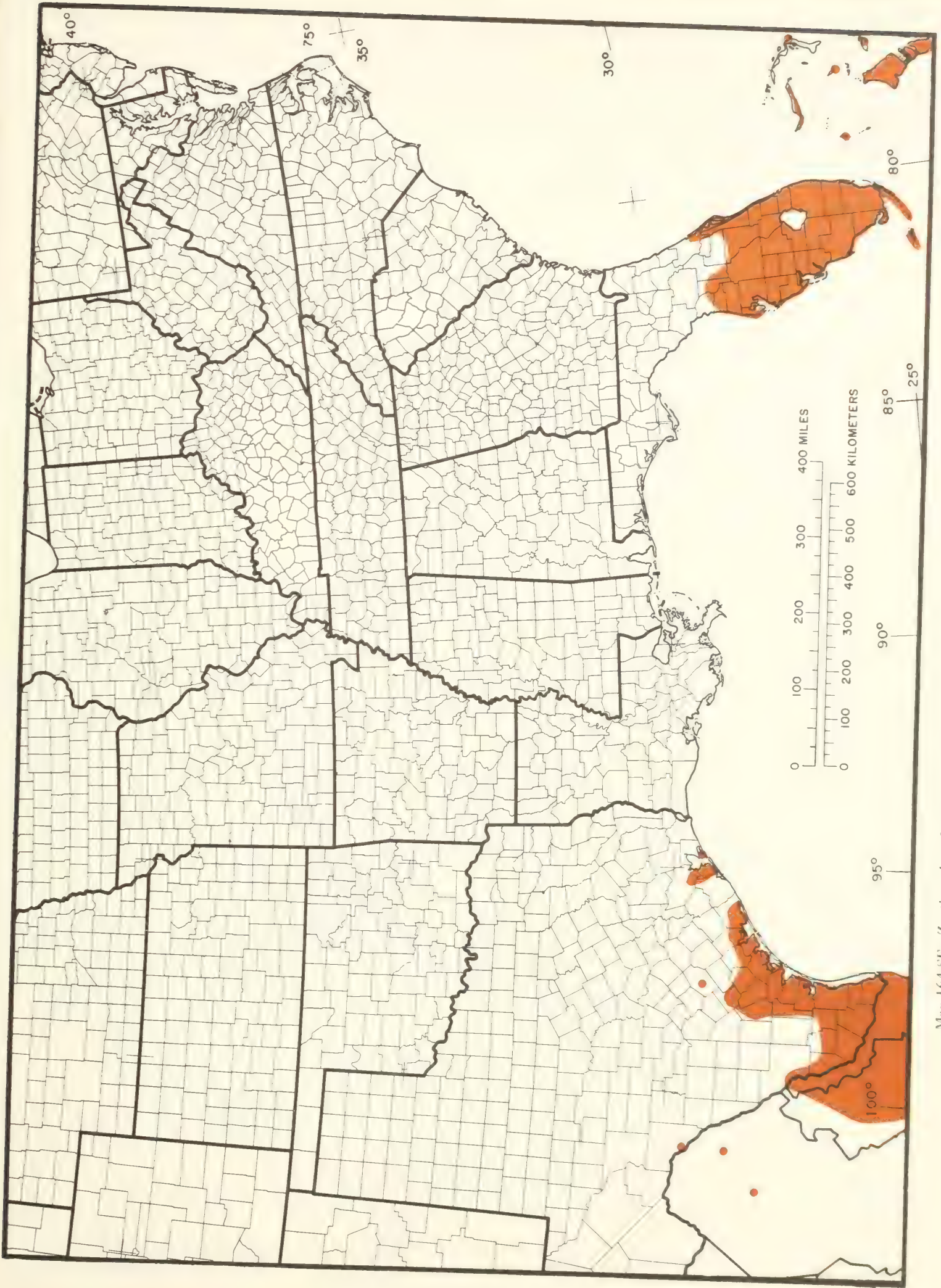
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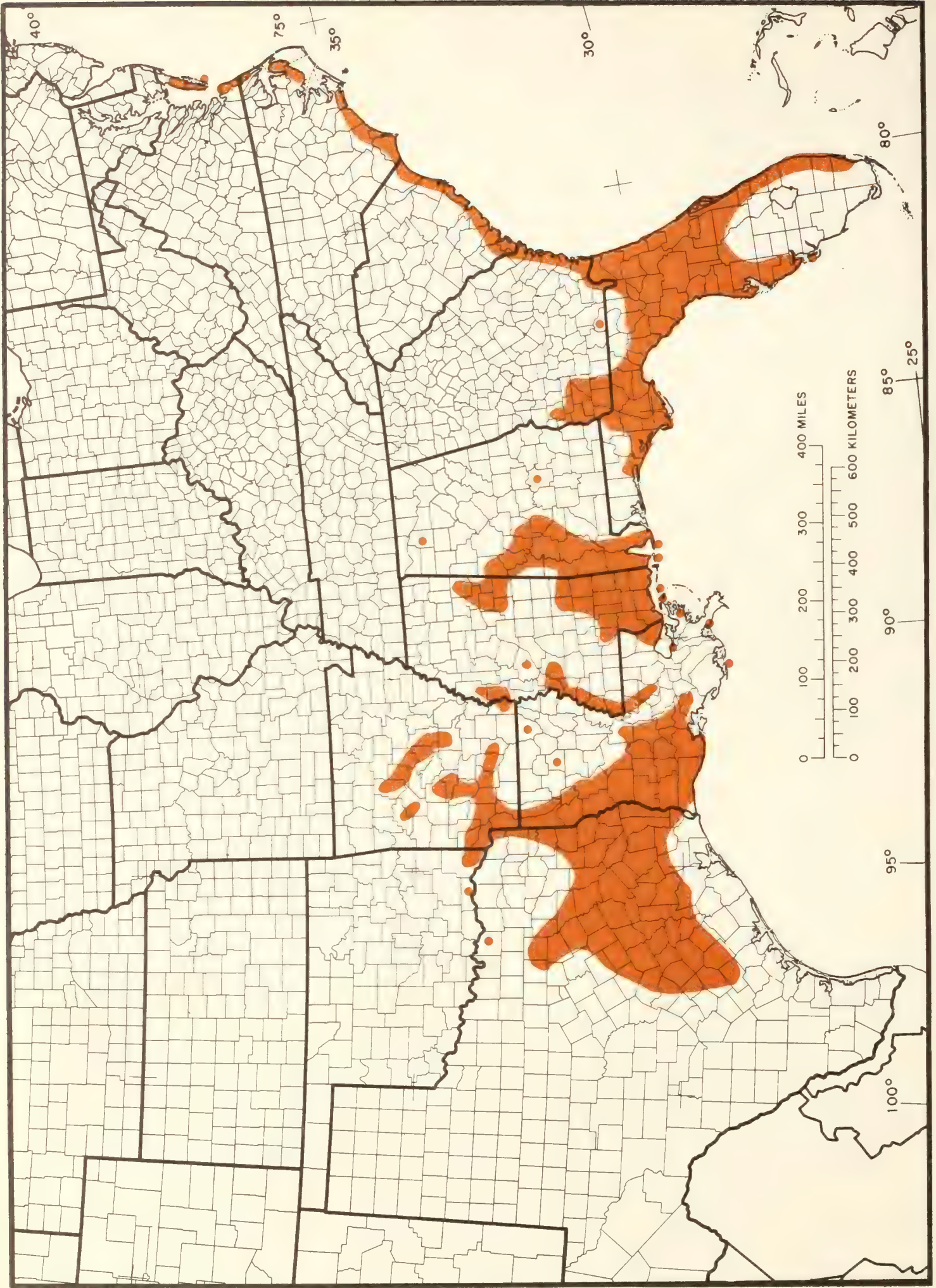
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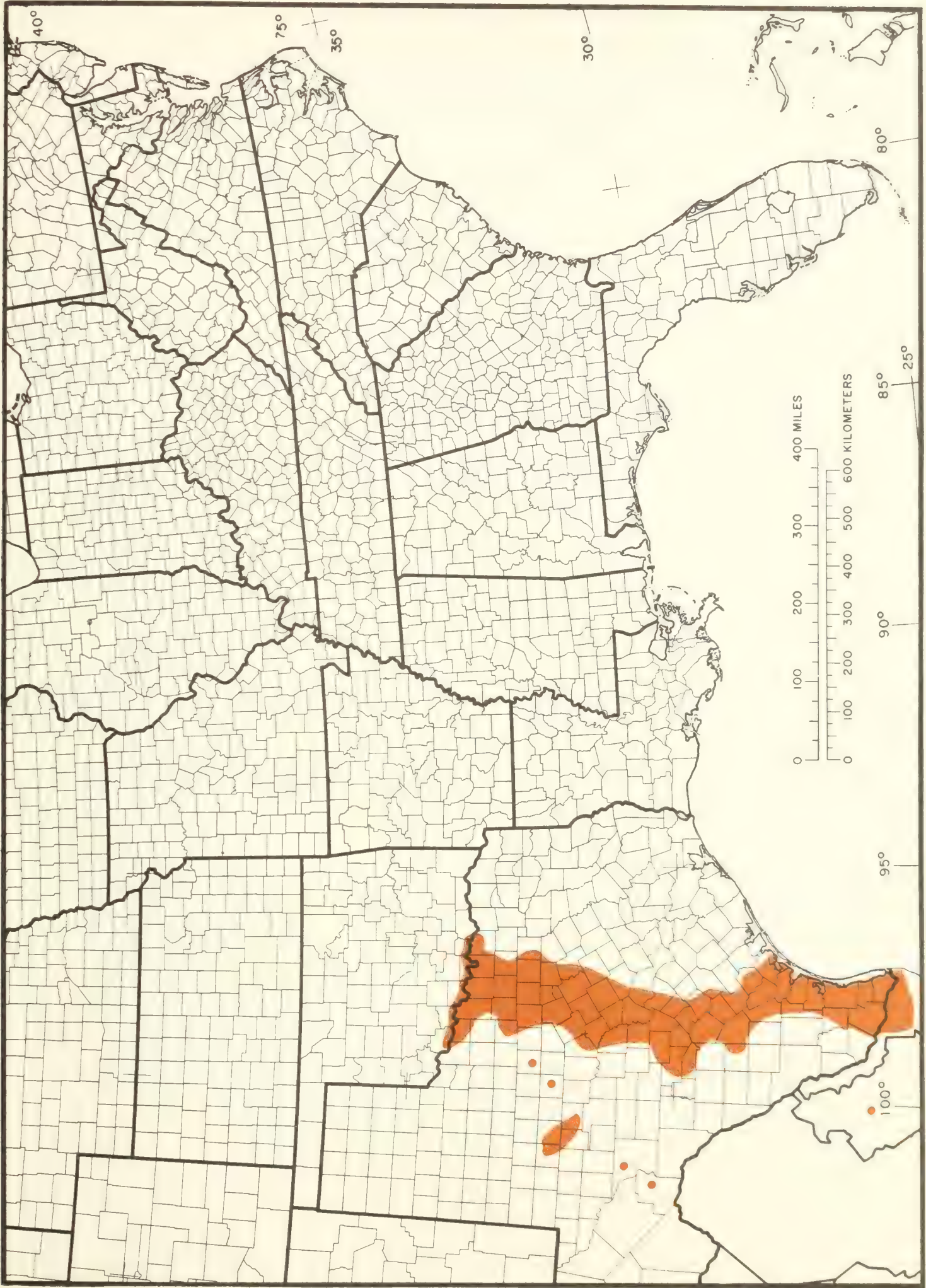
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